The RUBBER AGE

June 1944

NOLOGY DEPT.

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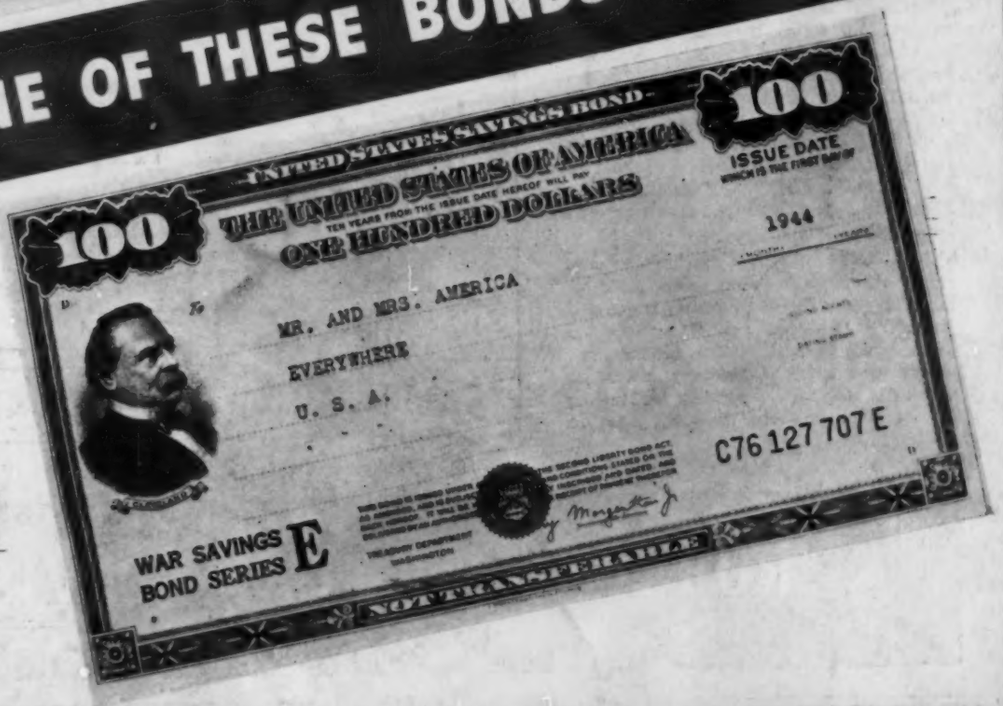
BUY ONE OF THESE BONDS TODAY !



Newsletter No. 6
JUNE, 1944
Published by Rubber Chemicals Division of DU PONT

BARAK ACTIVATION OF THIAZOLES IN GR-S

BARAK is unique in its effect on GR-S stocks. While it is completely inactive when used by itself, even in large amounts, it is a strong activator for acidic accelerators. Barak is an excellent activator for 2-MT and for all of the thiazoles, but it appears to be of most value when used in conjunction with MBTS.

AMOUNT TO USE: To obtain the highest efficiency from the combination, it is desirable to use a relatively high ratio of Barak to MBTS. In a GR-S stock containing easy processing channel black, a combination of 0.5 to 0.75 part Barak with 0.75 to 0.5 part of MBTS is usually preferred. Not only does the use of Barak permit conservation of the thiazole primary accelerator but it also results in stocks having a flatter cure and vulcanizates having both a high degree of resistance to crack growth and to deterioration on heat aging.

OUTSTANDING PROPERTIES: Chemically, Barak is dibutyl ammonium oleate. Being a non-accelerator of vulcanization, Barak is inherently non-persistent in GR-S. Its relatively strong activating effect on MBTS permits maintenance of a fast rate of cure in the presence of relatively small amounts of the thiazole accelerator as is shown in Figure I. The faster rate and higher state of cure obtained by Barak activation are indicated by the higher modulus and the smaller change in all properties with extended cure. The decrease in heat build-up further substantiates this fact.

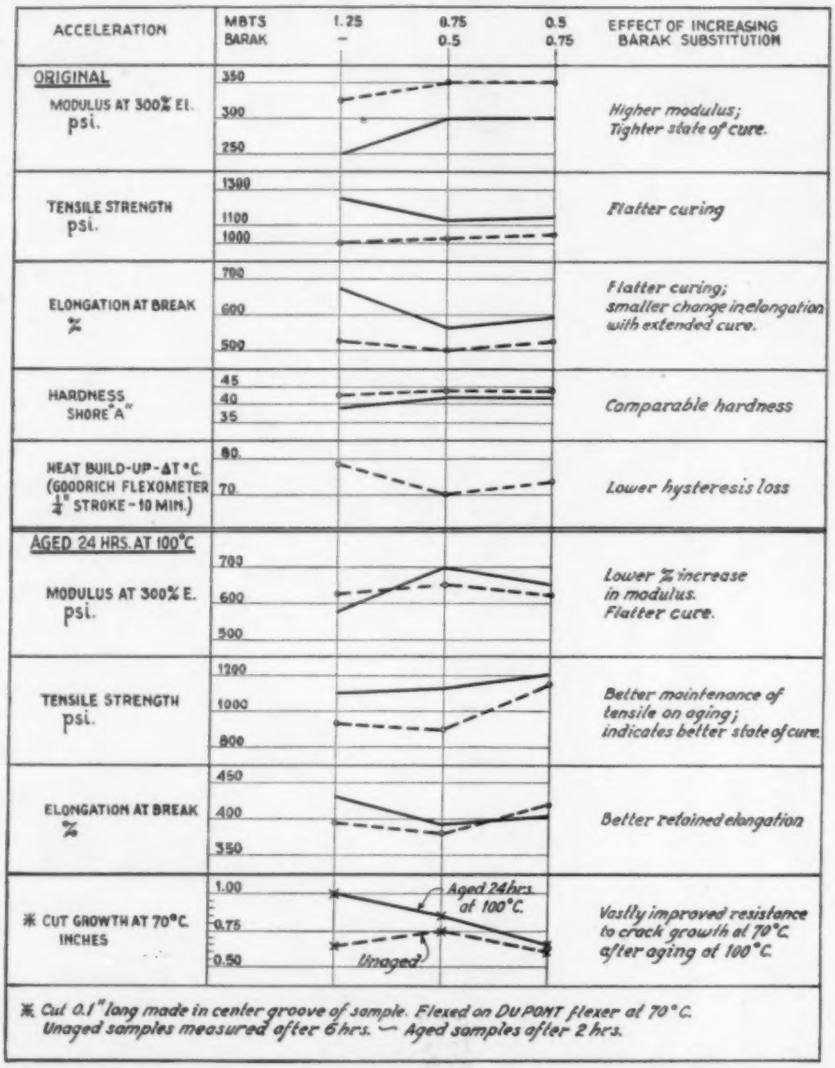
A consistent improvement in properties after aging at 100° C. is obtained by increasing the ratio of Barak to MBTS. The effect of Barak on resistance to crack growth after aging is outstanding. While the stock accelerated with straight MBTS cracked the full one-inch width in 2 hours when flexed at 70° C., the substitution of Barak for increasingly large amounts of the MBTS caused a proportional reduction in crack growth. As shown, the substitution of MBTS 0.5–Barak 0.75 for MBTS 1.25 parts reduced crack growth by 40 percent.

AVAILABILITY: Barak is made from currently non-critical raw materials. Manufacturing capacity is relatively large and it can, therefore, be supplied in quantities to meet your requirements. Consult the du Pont Technical Representative or write the Rubber Laboratory for further information or help on your specific problem.

FIGURE I
THE EFFECT OF BARAK ACTIVATION OF MBTS IN A GR-S STOCK

Base Compound	
GR-S	100.
Sulfur	2.
E.P.C. Black	20.
Softener	8.
Zinc Oxide	3.
Accelerator	As Indicated

KEY
cure
——— 60 min. at 280° F.
— — — 90 min. at 280° F.



* Cut 0.1" long made in center groove of sample. Flexed on DU PONT flexer at 70° C. Unaged samples measured after 6 hrs. — Aged samples after 2 hrs.

Back the Attack with War Bonds

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsbug, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. June, 1944, Vol. 55, No. 3.

COPIES of the new, loose-leaf Hycar Blue Book, covering the compounding and processing of Hycar synthetic rubber, have been distributed as widely as possible to interested executives. Through this book, we hope to keep the industry informed of the latest developments in Hycar processing. With this thought in mind, the various sections and groupings have been arranged to facilitate inserting additional or superseding material.

While material shortages have limited the supply of loose-leaf binders for this Blue Book, complete sets of the text, without binders, can still be supplied. It will be necessary to restrict their distributi[on] Goo[d] Rubber Companies, Rubber Consultants, Offices [and] abora-tories of Suppliers to the Rubber Industry, an[d] pecific Rubber Laboratories of Educational and Research Institutions.

We will do our best to fulfill all requests for the Hycar Blue Book to take care of your actual requirements. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

Reg U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

PHILBLACK A

A new, very-easy-processing HMF type black which combines the advantages of channel and furnace blacks

• LOW HYSTERESIS
• GOOD ABRASION RESISTANCE
• HIGH RESILIENCE
• HIGH TENSILE STRENGTH
This excellent combination of qualities makes Philblack A especially valuable for use in compounding both tire and mechanical goods made from synthetic rubber.

The properties and advantages of this new and different type black are completely presented in a new booklet "PHILBLACK A". Write or wire for this booklet, prices, availability, and samples.

PHILLIPS PETROLEUM COMPANY
Philblack Division

FIRST CENTRAL TOWER • AKRON, OHIO

An announcement of importance to the Rubber Industry

Geon

Vinyl Resins & Plastics

Highly versatile synthetic materials offered to manufacturers and fabricators

FROM GEON may be made a wide variety of thermoplastic elastomers which can be extruded, pressure or injection molded, calendered, cast into sheet and film, or used as coatings for fabric and paper.

GEON, properly blended, will impart some of its characteristics to certain synthetic rubbers. Or, a different type of product with certain desirable characteristics may be made when the synthetic rubber is used as a plasticizer for GEON.

The following properties in various combinations may be found in products of GEON:

- Flexible
- Waterproof
- Light weight
- High tensile strength
- Easily embossed
- Wide range of colors and luster
- Electrical insulation
- Odorless
- Wide hardness range

Resistance to

Acids	Foods	Mildew
Alkalies	Light	Cold
Chemicals	Air	Heat
Oil	Aging	Abrasion
Gasoline	Flame	Sticking

Already many new — and, in some cases, revolutionary — uses have been found in such fields as extrusion and molding, electronics, metals, textile, paper, packaging, rubber, food and beverage, and many others in which a seemingly limitless number of uses is yet to be discovered.

Does all this suggest some new product or application or use to you? Our research staff and laboratory facilities are ready to help you. Chemical Division, The B. F. Goodrich Co., Rose Building, Cleveland, Ohio.

★ ★ ★

For an informative folder which further describes GEON'S properties and suggests many applications, or for answers to your questions, write Dept. K-1, Chemical Division, Rose Building, Cleveland 15, Ohio.

GEON is available to industrial users subject to allocation under General Preference Order M-10. Limited quantities can be had for experiment.

A typical example of
B. F. GOODRICH DEVELOPMENT IN RUBBER

"The jagged holes were made by machine gun bullets that went right on through, but the tire didn't go flat. . . . Even with the air gone the tire itself will support the load and run forty miles before going flat."

Photograph courtesy of B. F. Goodrich

When Rubber is

MORE THAN RUBBER

New Qualities Long Hoped for Developed in Various Synthetics

Out of our war-time shortages of natural rubber have come many synthetics that render a greater service. And here's the major reason. These synthetics were custom-built to *specific* rather than general needs.

The J. T. Baker Chemical Co., in step with the changing chemical needs of those who work with rubber, has been going along with this expanding technology. When chemicals were required to give synthetics certain qualities, Baker frequently made these chemicals to the rubber industry's defined specifications.

Today, Baker not only supplies large quantities of Calcined Magnesia to meet the exacting requirements of Neoprene compounders, but also Magnesium Carbonate for its reinforcing qualities and high tensile strength.

Baker makes four other sales leaders for the rubber industry to predefined specifications: Calcium Nitrate, Lead Acetate, Lead Peroxide and Carbon Disulfide.

If you have need for one or more of these chemicals—or require a special chemical custom-built to your own rigid specifications, we urge you to write. Our chemical, technical and executive staffs are at your service. Your inquiry will be treated in strict confidence.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, New Jersey. *Branch Offices:* New York, Philadelphia and Chicago.

6 Baker Chemicals

FOR THE RUBBER INDUSTRY

MAGNESIUM OXIDE
MAGNESIUM CARBONATE
CALCIUM NITRATE
LEAD ACETATE
LEAD PEROXIDE
CARBON DISULFIDE

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Baker

RELIEF IN SIGHT!

Is your tubing production "tied up" because of tough, nervy GR-S?
There is a proven remedy... NAFTOLEN!

NAFTOLEN swells the GR-S, thus providing a smooth-processing stock.

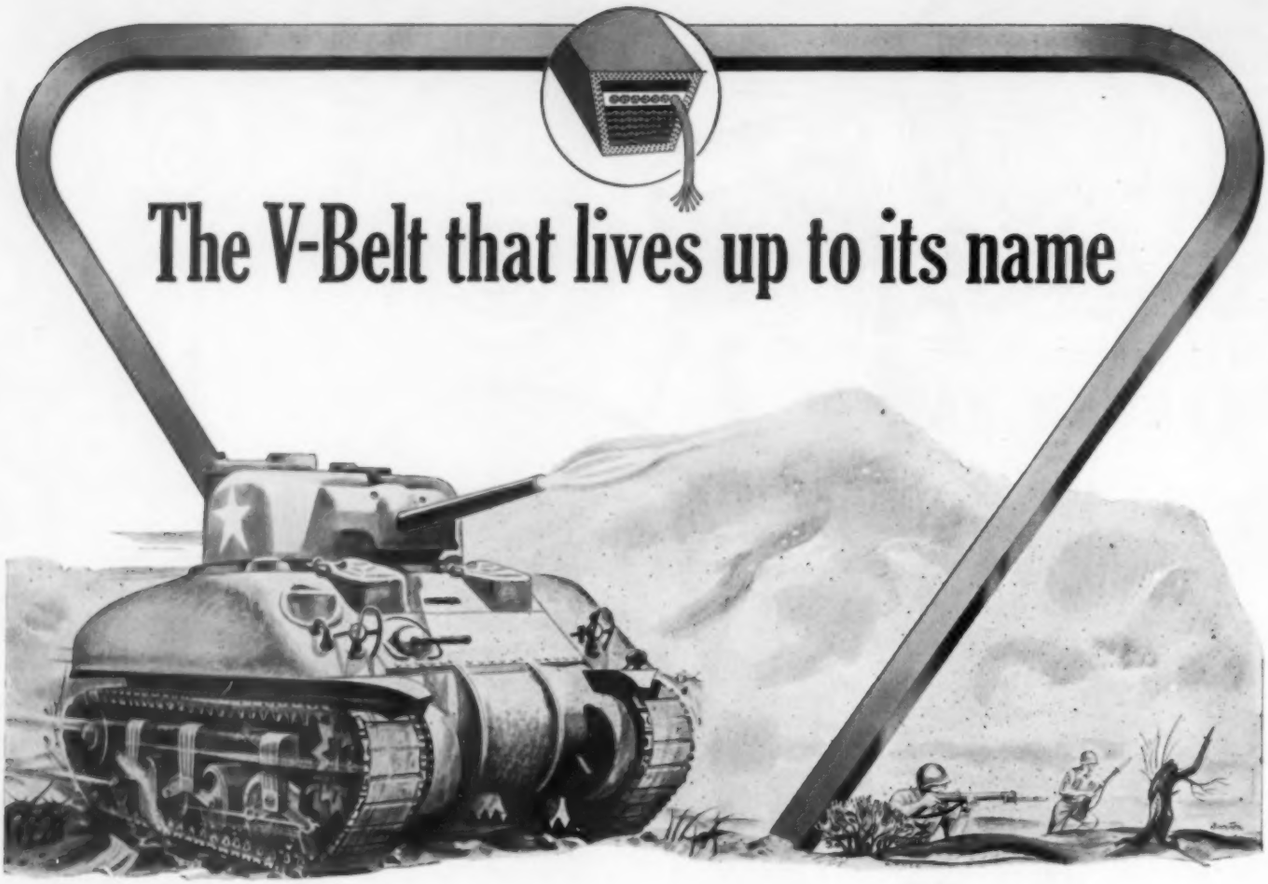
Take the GR-R-R-R out of GR-S; use NAFTOLEN, the product that gives

Smoothness

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street, New York 16, N. Y.

"NAFTOLEN" Reg. U. S. Pat. Office



The V-Belt that lives up to its name

THERE'S a new reason for calling them . . . V-belts. For the "V" now symbolizes victory over the chief causes of ordinary V-belt failures that at one time gave Army engineers many a headache.

These new type V-belts have to meet severe service driving the generators, fans, fuel and water pumps in armored tanks. Ordinary fan belts with cotton cords couldn't stand up under the high temperatures generated by high-powered tank engines. The extreme heat caused cotton cords to stretch, engines overheated—often resulted in stalling—and the higher the heat, the shorter the life of the belt.

To meet Army requirements that V-belts should perform satisfactorily for the life of the engine, various types and construction of reinforcing cable were tried. But none proved entirely satisfactory until National-Standard's engineers, long experienced in developing and combining fine wire with rubber, licked the problem. The wire had to be suitable for stranding with high uniformity—any twist would tend to make the belt twist . . . providing maximum adhesion to rubber was highly essential.

How well National-Standard helped leading V-belt manufacturers meet Army specifications is evidenced by the additional use of these belts for many trucks and gun carriers.

Similar type V-belts are used for power transmission drives — longer life—accurate and more permanent fit permits the use of fewer belts per driving unit. Wire reinforcement has eliminated excessive stretching in conveyor belts too, made possible heavier loading, longer life and great economy.

This is typical of National-Standard's service to all industry—perhaps this research and engineering skill can be utilized to improve your products. Why not write and find out?

NATIONAL STANDARD Company

BACK THE ATTACK • BUY MORE WAR BONDS

Divisions of National-Standard Company

NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

ATHENIA STEEL
Clifton, N. J.
COLD ROLLED, HIGH-CARBON SPRING STEEL

WAGNER LITHO MACHINERY
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY

WORCESTER WIRE WORKS
Worcester, Mass.
•
ROUND STEEL WIRE, SMALL SIZES

GENERAL CHEMICAL

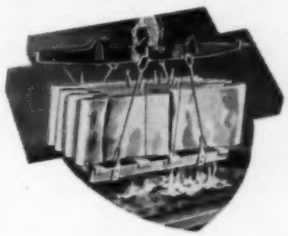
AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY

Petroleum

Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.

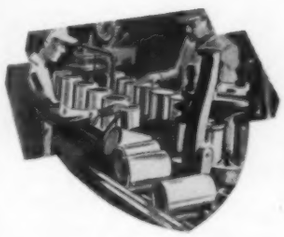
Rayon

Used in the spinning bath in rayon manufacture.



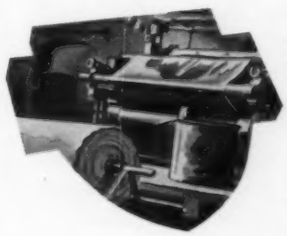
Steel

For pickling of steel sheets and castings; removes oxides and scales.



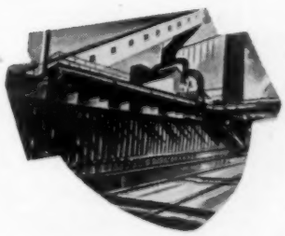
Paints

Raw material in production of pigments; for sulfonating drying oils.



Sulfonation

Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.

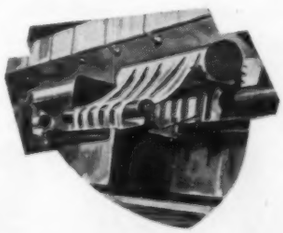


Coke By-Products

For washing toluene and benzene, raw materials for dyestuffs and explosives.

Fertilizers

Used in super phosphate and ammonium sulfate production.



Textiles

For carbonizing wools and for the dyeing bath in production of textiles.

GRADES OR STRENGTHS

Standard: From 60° Baume to 65% Oleum (114.6% H_2SO_4)

Special High Purity:

Diamond—66° Baume, Carboys Only

Crystal —66° Baume, 98% H_2SO_4

From Carboys to Tank Cars & Barges

RECENTLY RELEASED: New technical information on physical and chemical properties of Fluosulfonic Acid. Write nearest Technical Service office for Bulletin 33A.

GENERAL CHEMICAL COMPANY

40 RECTOR STREET NEW YORK 6, N. Y.

Technical Service Offices: Atlanta · Baltimore · Boston · Bridgeport (Conn.) Buffalo · Charlotte (N. C.) · Chicago · Cleveland · Denver · Detroit · Houston Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh Providence (R. I.) · St. Louis · Utica (N. Y.)

Pacific Coast Technical Service Offices:

Los Angeles · San Francisco · Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Company, Limited · Montreal · Toronto · Vancouver

it takes more than *reputation* to maintain a good

SOME of the best of good mixers are breaking down now under the strain of synthetic compounding. No amount of past glory or vaunted strength and ability can prevent the loss that follows forced idleness of essential productive equipment . . . *There is a way* to maintain the ability of a good mixer—in many cases have it improved over its past performance—*We know how* . . .

The Industry's Headquarters for Mixer Repairs—

INTERSTATE

914 Miami Street - - - - - Akron,

mixer...

WE HAVE worked closely with the maintenance engineers in the heart of the Rubber Industry . . . We have designed and built changes in some of their mixers for meeting specific problems arising out of the synthetic program . . . We have repaired hundred of mixers . . . But that is not enough for the needs of the Industry today. Out of the experience and skill and collaboration with men on whom depends the bulk of the world's synthetic compounding, we have developed the "know how" to *rebuild* mixers for *faster, more efficient* work. We have met almost every type of mixer problem—and with improved results. It is such skill that will pay you *better* mixers dividends. Arrange now for a rebuilding program that will bring your mixers to maximum output—and hold them there for a long, long time—Write, wire or phone us.

WELDING SERVICE

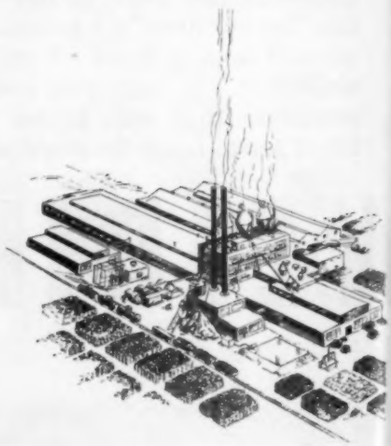
Ohio - - - - - - Phone JEfferson 7970

Midwest Announces...

A NEW RESEARCH LABORATORY

Now... Two plants devoted to Maximum Production for War Requirements

Plus... Research facilities for development of Present and Post-War Reclaiming of Natural and Synthetic Rubbers.



MIDWEST RUBBER RECLAIMING CO.

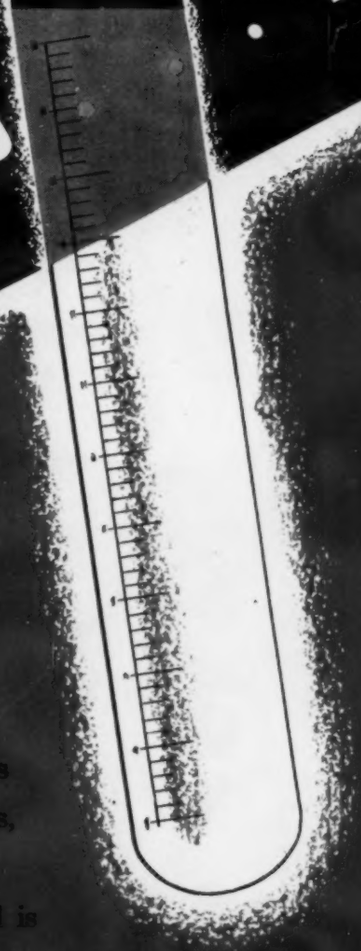
East St. Louis, Ill.
East 7400

★ ★ ★

Barberton, Ohio
Sherwood 3131

A NEW SELF-ACTIVATING ACCELERATOR FOR GR-S

AERO AC 165*



Aero AC 165 is a new accelerator that brings much-sought properties to GR-S formulations. Aero AC 165 disperses readily, and has low scorching tendencies, and other safe processing qualities.

With Aero AC 165 only one material is required for the accelerating action. Aero AC 165 produces vulcanizates with good physical properties, including better cut growth resistance and improved aging characteristics.

The advantages of Aero AC 165 over the usual straight thiazole or D. P. G. activated thiazole are reported in technical detail in a new Cyanamid book of timely interest to GR-S compounders. May we send you a copy?

A WELL-ROUNDED SERVICE TO THE RUBBER INDUSTRY

★

AERO AC 50**

AERO BRAND DOTG

AERO BRAND DPG

AERO** BRAND ACRYLONITRILE

AERO BRAND RUBBER SULPHUR

K & M MAGNESIUM OXIDE

K & M MAGNESIUM CARBONATE

DIBUTYL PHTHALATE

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:

Akron Chemical Co.
AKRON, OHIO

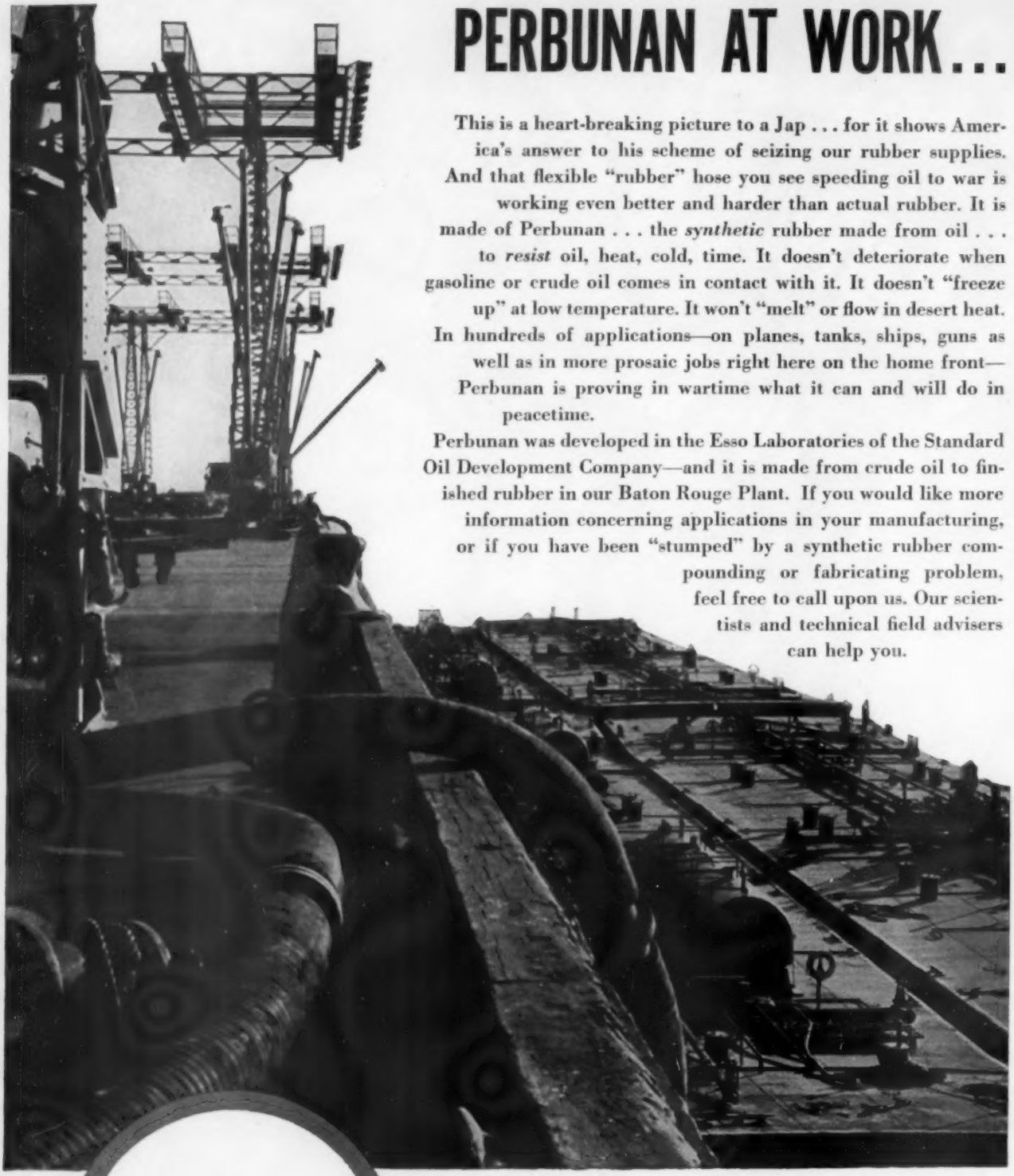
Boyd-Stanley & Company
BOSTON, MASS.

Hilton & Meyer
CHICAGO, ILL.

H. M. Royal, Inc.
LOS ANGELES, CALIF.

H. M. Royal, Inc.
TRENTON, N. J.

AMERICAN CYANAMID
& CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.



PERBUNAN AT WORK...

This is a heart-breaking picture to a Jap . . . for it shows America's answer to his scheme of seizing our rubber supplies. And that flexible "rubber" hose you see speeding oil to war is working even better and harder than actual rubber. It is made of Perbunan . . . the *synthetic* rubber made from oil . . . to *resist* oil, heat, cold, time. It doesn't deteriorate when gasoline or crude oil comes in contact with it. It doesn't "freeze up" at low temperature. It won't "melt" or flow in desert heat. In hundreds of applications—on planes, tanks, ships, guns as well as in more prosaic jobs right here on the home front—Perbunan is proving in wartime what it can and will do in peacetime.

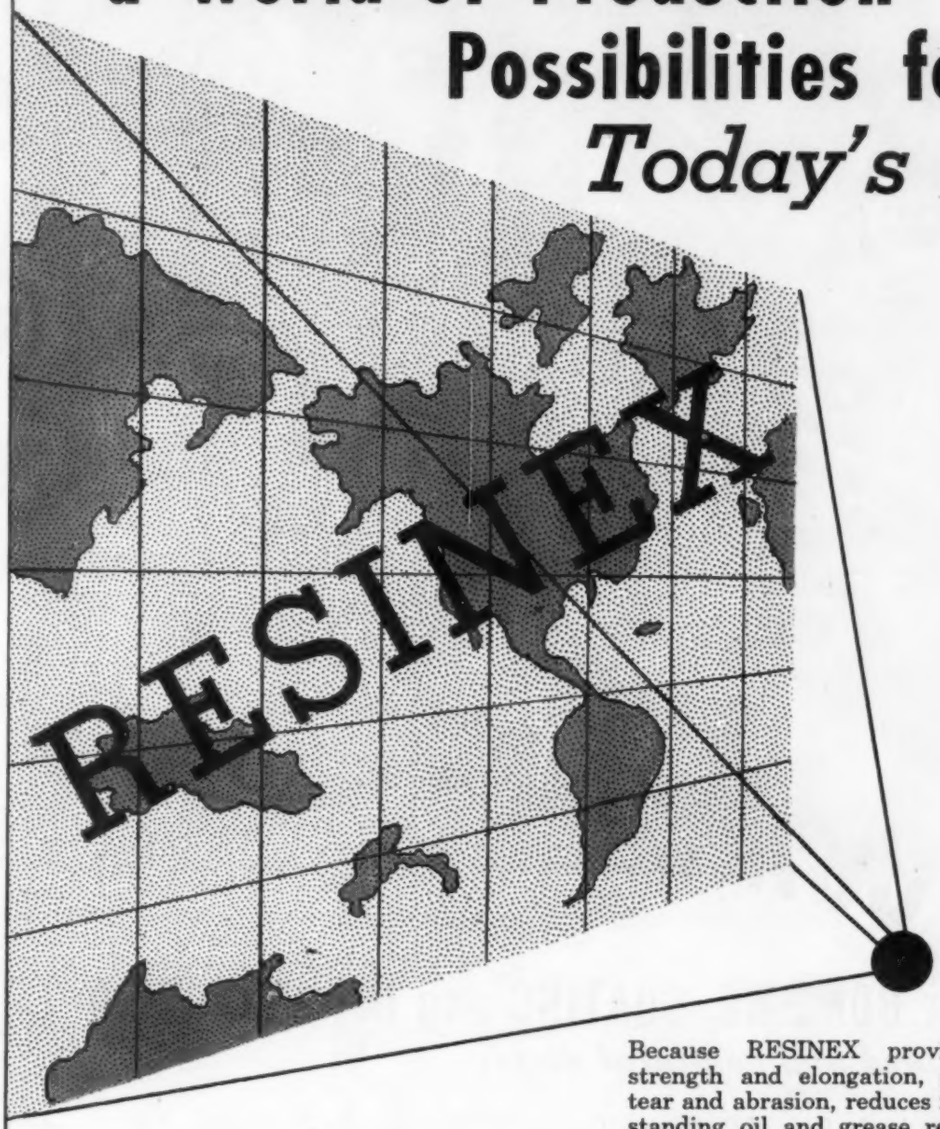
Perbunan was developed in the Esso Laboratories of the Standard Oil Development Company—and it is made from crude oil to finished rubber in our Baton Rouge Plant. If you would like more information concerning applications in your manufacturing, or if you have been "stumped" by a synthetic rubber compounding or fabricating problem, feel free to call upon us. Our scientists and technical field advisers can help you.

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Write STANCO DISTRIBUTORS, Inc.
26 Broadway, New York 4, N. Y.
Warehouse stocks in New Jersey, California and Louisiana

a world of Production Possibilities for *Today's* needs



Because RESINEX provides greater tensile strength and elongation, greater resistance to tear and abrasion, reduces flex cracking, has outstanding oil and grease resisting properties its field of uses in today's production needs is almost unlimited . . . In every product containing this resinous, thermoplastic extender-plasticizer —tires, tubes, camelback, tank track, soles, heels, hose, insulation tubing, printers' rolls—a definite improvement in the quality and service of the finished article or material has been noted . . . RESINEX is plentiful and low in cost.

Write for Laboratory facts and samples for test run.

STANDARD *Chemical Company*

General Offices: AKRON 8, OHIO

BUNA COMPOUNDS

for BONDING, COATING and IMPREGNATING

(Cured and non-cured stocks)

Longtime specialists in the fields of Combining, Coating and Impregnating Compounds, the UBS Laboratories are ideally set up to develop the particular Buna Compounds your operations require. The UBS Laboratories not only know thoroughly the compounding advantages and limitations of all the latest synthetics (Neoprene, Hycar, Buna, Vinylite, etc.), but even have developed an original synthetic latex and synthetic rubber of their own. *Write today, describing your Bonding, Coating and Impregnating Problems.*

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

CALCENE T AND SILENE EF...

Two Outstanding Pigments Important to Rubber Compounders

These two Columbia pigments—developed especially for the rubber industry—are winning greater favor every day with Compounders.

Silene EF, a white, finely divided hydrated calcium silicate, confers high modulus, hardness, tear resistance and good tensile strength up to high loadings.

Calcene T, a coated precipitated calcium carbonate product of extremely fine particle size, confers low modulus, high tensile strength, high resistance to tear and abrasion, smooth, fast extension, and good general processing properties.

They're working together in GR:S and other rubbers to produce stocks possessing a wide variety of desirable properties.

If you've yet to become acquainted with these two excellent Columbia pigments, samples and data will be sent at your request.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING • PITTSBURGH 19, PA.

CHICAGO • • • BOSTON • • • ST. LOUIS • • • PITTSBURGH • • • NEW YORK • • • CINCINNATI
CLEVELAND • • • MINNEAPOLIS • • • PHILADELPHIA • • • CHARLOTTE

WATER, WATER—a veritable lake of it is required for the daily operation of Columbia plants. Visualize a body of water one mile long, over 500 feet wide and 10 feet deep. Within 24 hours it would be drained completely dry in order to keep Columbia plants in average production.

A THIRSTY CHEMICAL is Columbia Calcium Chloride. Its nature causes it to dissolve itself when exposed to relative humidities above 30-35%. Because of this, a fast-growing use is its employment as an economical dehumidifying agent in basements and other storage areas where dampness must be overcome. Its effectiveness can be gauged by the absorption capacities of one pound of 77-80% Calcium Chloride. At a relative humidity of 70, it absorbs two pounds of water . . . at a relative humidity of 90, it absorbs five pounds of water—or five times its own weight!

TOUGH GOING! In drilling the shafts for Columbia's limestone mine at Barberton, Ohio, 22.6 pounds of dynamite were required for each foot. As the total depth of the two shafts is 4,581 feet, approximately 52 tons of dynamite were used in preparing the way for what is now the world's deepest limestone mine—2,323 feet.

ONLY A V-MAIL letter is always certain to reach its destination overseas. For if the plane carrying your letter is lost, a record of its mail cargo quickly leads to the dispatch of a duplicate copy. Use V-Mail for fast, sure service . . . and to conserve valuable cargo space. One cargo plane can carry 400,000 V-Mail letters. 112 planes are required to transport the same number of standard size letters—an important factor in the handling of 34,000,000 pieces of overseas mail *each week!* And remember—V-Mail is the *only* mail that *always* flies.

COLUMBIA CHEMICALS include Soda Ash, Caustic Soda, Sodium Bicarbonate, Liquid Chlorine, Silene EF (Hydrated Calcium Silicate), Calcium Chloride, Soda Briquettes, Modified Sodas, Caustic Ash, Phosflake, Calcene T (Precipitated Calcium Carbonate), and Calcium Hypochlorite.

Sound the Alert!

MANAGEMENT
LABOR

—for the 5th War Loan drive during June and July. The need for the 5th War Loan is immediate, crucial. For impending events may make the 5th the supreme financial effort of the war.

The U. S. Treasury has set the overall goal at $16,000,000,000 — $6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised.*

That's why the U. S. Treasury asks Management and Labor to sit down together and organize—NOW!

For organization—good organization—has been responsible for the excellent showing of the payroll market. And its most important single superiority has been personal solicitation—desk to desk, bench to bench, machine to machine personal solicitation. 71% of all persons on payroll deductions were solicited for the 4th War Loan.

Now, to personal solicitation, add the sales incentive of a definitely established plant quota. Build your campaign around a quota plan. Set up departmental goals. Stress percentage of participation figures. Stimulate group enthusiasm.

In planning your quota campaign, work in close cooperation with the Chairman of your War Finance Committee. Everything is set to make the 5th War Loan drive a huge success—with your help!

(Note: You've read this message. If it doesn't apply to you please see that it reaches the *one* person who can put it in action!)

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. 90% of the employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: **JOHN DOE Mfg. Co.** — 1,000 Employees

1,000 employees x $100 Regular Payroll deductions during the eight weekly payroll Accounting Periods of June and July = $100,000 Cash Quota

30,000
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Parts by Weight	#1	#2	#3	#4	#5
GR-S	100.	100.	100.	100.	100
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Stearite	2.	2.	2.	2.	2.
Mercaptobenzothiazole	1.5	1.5	1.5	1.5	1.5
Sulfur	2.	2.	2.	2.	2.
Witco #12 Channel Black	50.	50.	50.	50.	50.
Witco #38 M. R.	0.	10.	20.	30.	40.
Width of Crack after 19,000 Flexing Cycles (in centimeters)	2 3	1.1	0.67	0.42	0.34

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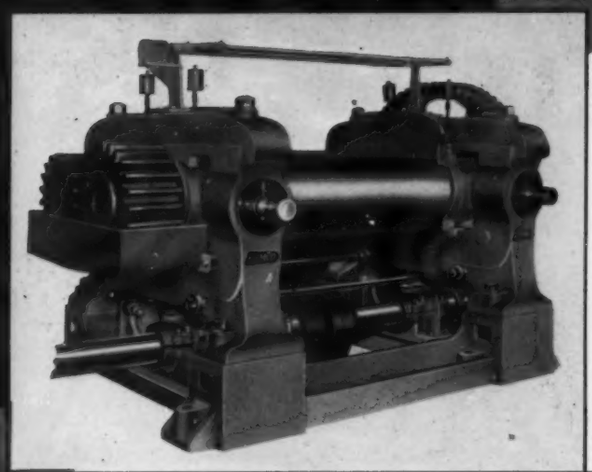

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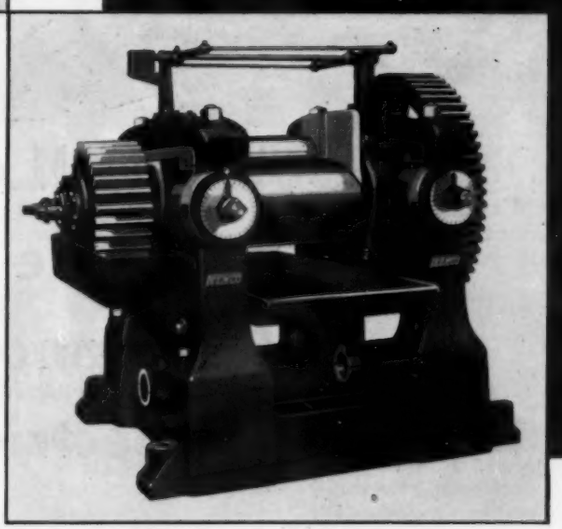

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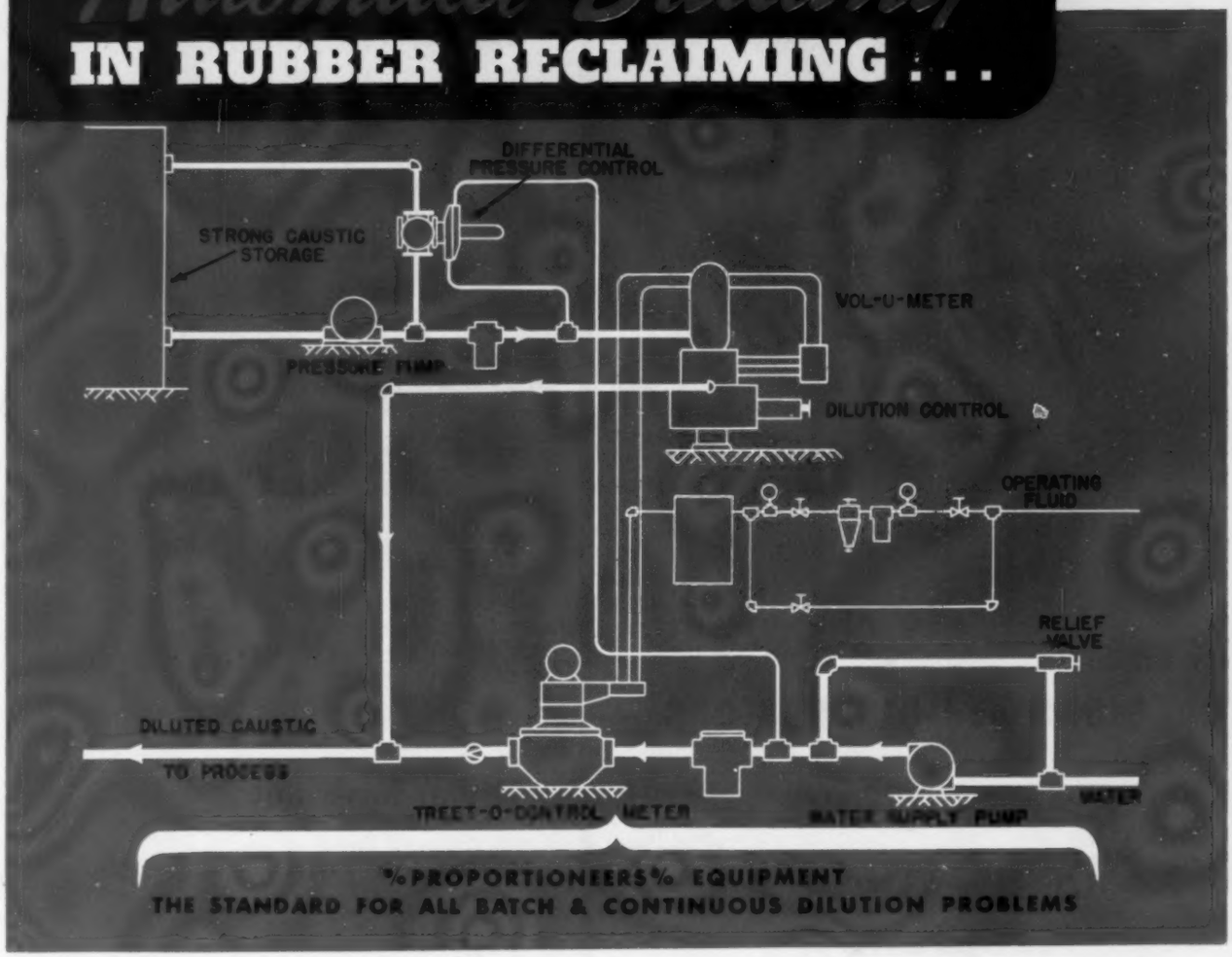

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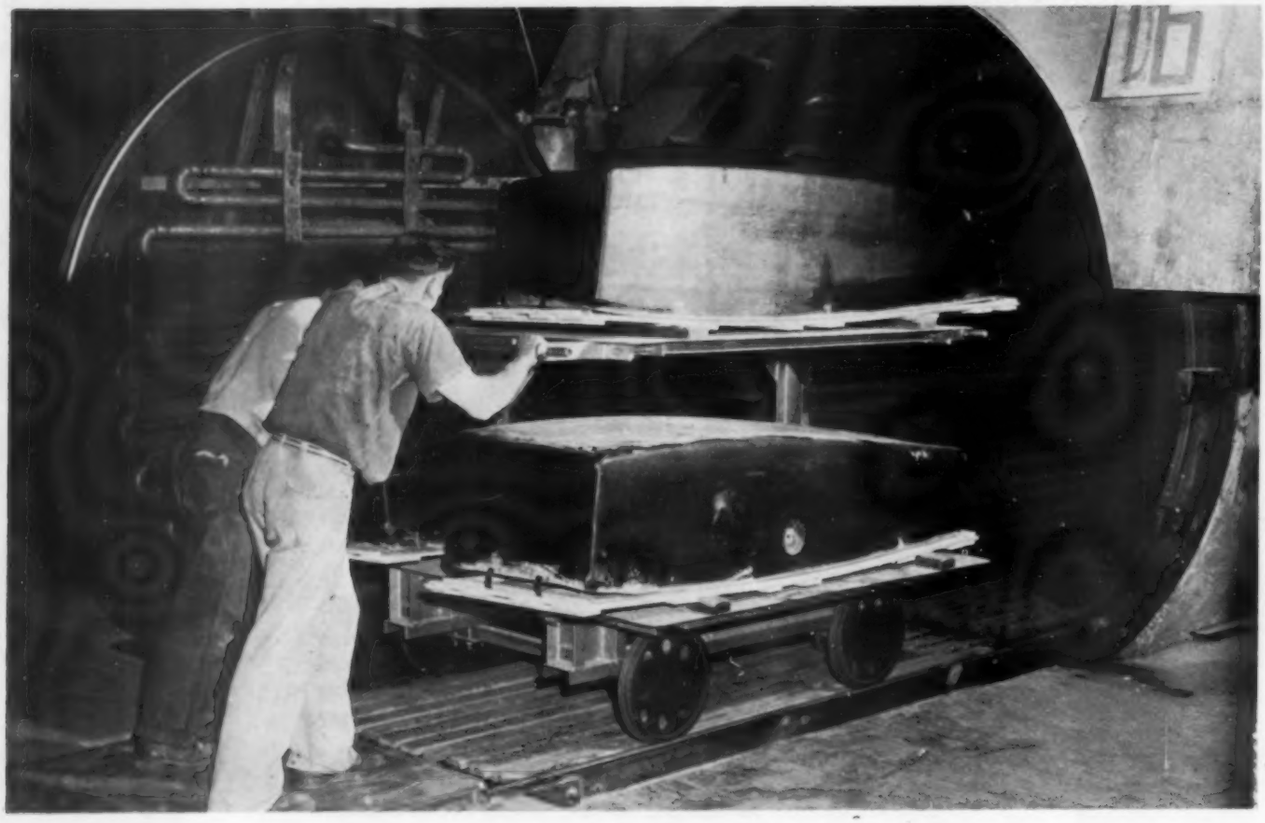

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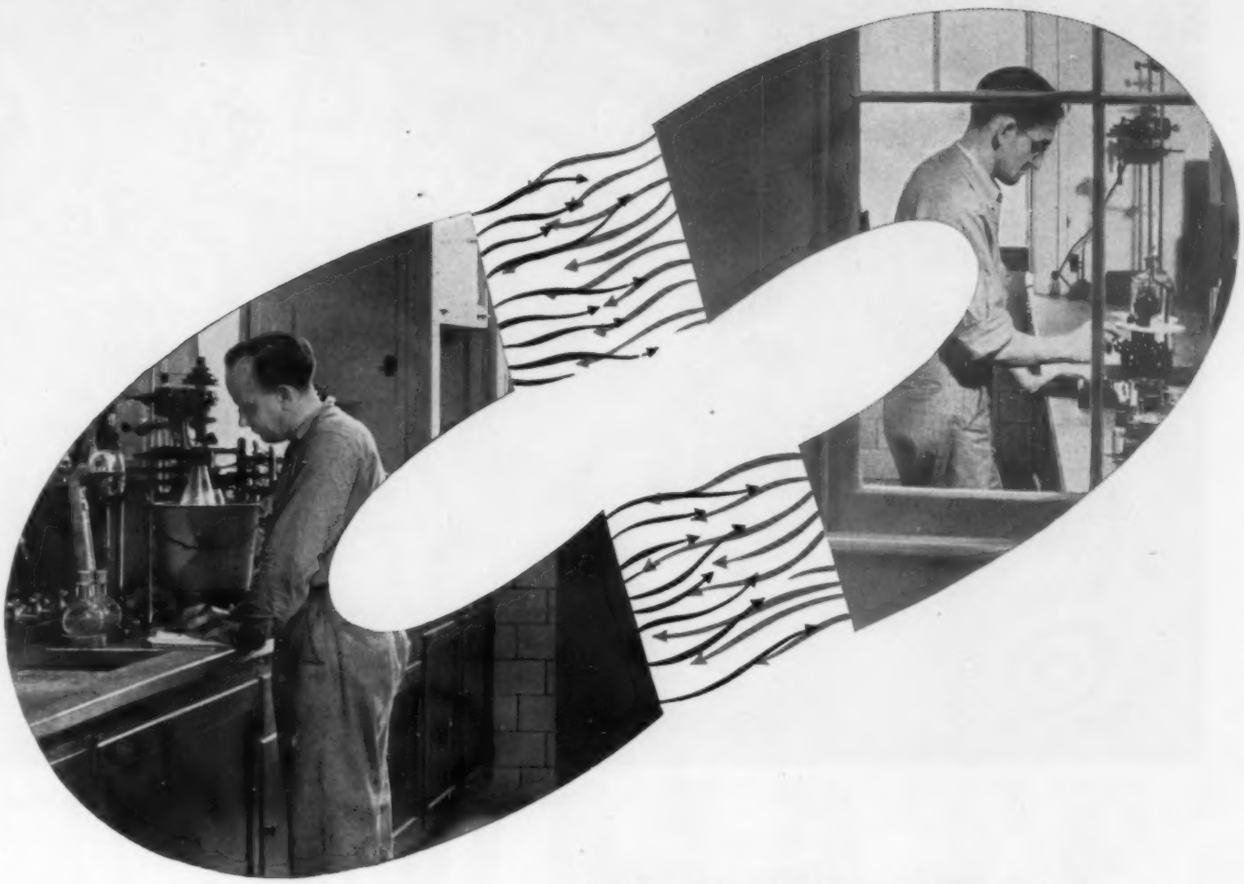

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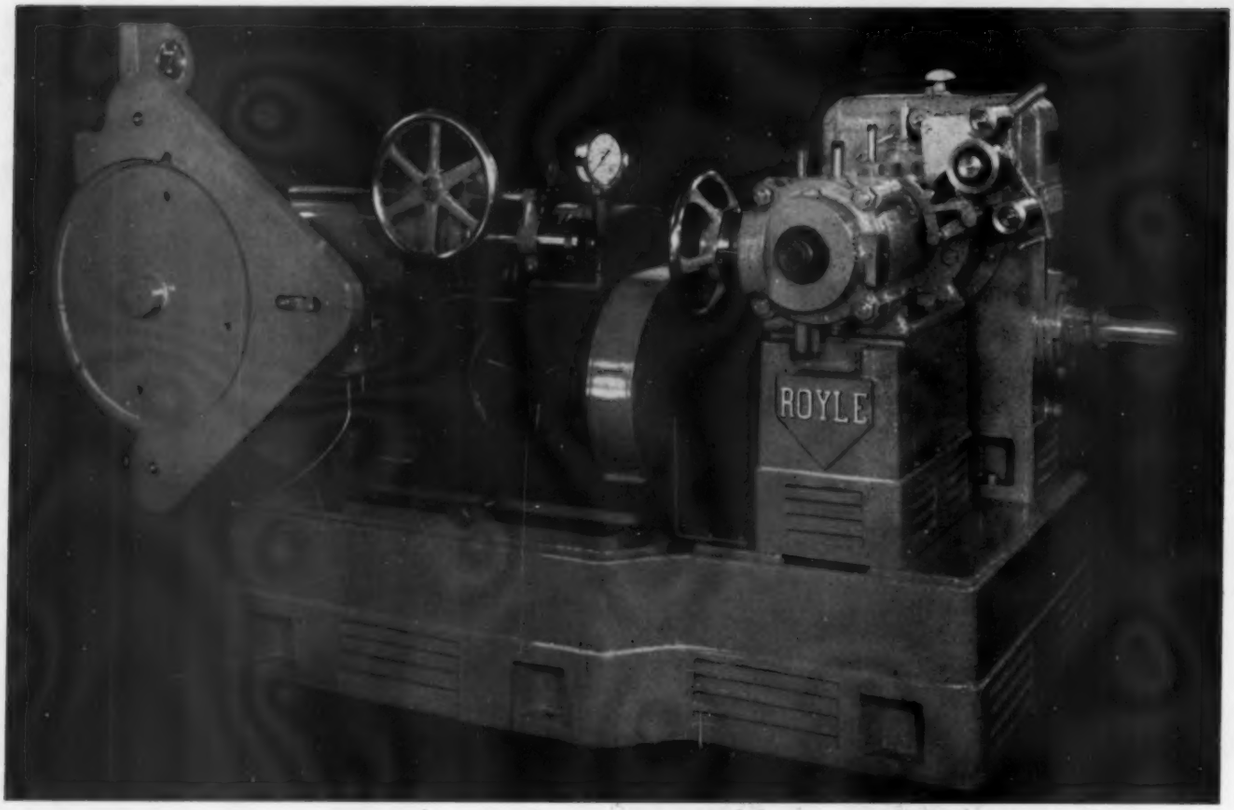

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The **RUBBER AGE**

VOL. 55, No. 3 **JUNE, 1944**

A Basic Compounding Study of Carbon and Non-Carbon Pigments in GR-S

By ALAN R. LUKENS*

Director of Research, Thompson, Weinman & Co., Inc., Cambridge, Mass.

PURE GUM vulcanizates of natural rubber with tensile strength ranging from 3,000 to 5,000 pounds per square inch made it possible to incorporate therein large volumes of extender and reinforcing pigments to meet the varied needs of the industry. The advent of GR-S with its almost complete lack of pure gum strength has presented many new problems in respect to the proper choice and use of these pigments.

Pigmentation of GR-S

An ideal reinforcing pigment for use in GR-S is one which will increase strength, abrasion, tear resistance, flexing, etc., at various volume loadings, yet facilitate easy processing. Channel blacks appear to achieve the first of these requirements, but often fail to process well. Furnace and thermal blacks give less reinforcement, but in turn process better than do the channel blacks.

Non-black pigments which reinforce GR-S are few in number and generally are more costly upon a volume basis than the black pigments. They are: magnesium oxide, certain clays, titanium oxide, zinc oxide and certain grades of calcium silicate. Their ability to reinforce is considerably less than that of the channel blacks. As agents to promote processing, these non-black reinforcing pigments are not noteworthy.

Next to consider are the non-black extender pigments. Many technicians, not familiar with the best use of extender pigments in GR-S, unfortunately expect them to accomplish reinforcement when their greatest potential value resides in other functions. In natural rubber, one of the best known potentialities of extender pigments was to promote good processing. When used in GR-S, the extender pigment, if properly selected, will accomplish good processing, yet not dilute desirable physical properties of the vulcanizate.

In other words, a good extender pigment will extend volume without depreciation in quality of the vulcanizate and will at the same time accomplish the prime purpose of aiding manufacture.

It is the purpose of this present work to demonstrate how non-black pigments may be used to obtain additional functions. This method of broadening the usefulness of these pigments we shall call co-pigmentation.

Co-Pigmentation

By means of co-pigmentation, that is, the co-use of an extender pigment and a reinforcing pigment, one may obtain definite advantages, as indicated by the following:

GR-S Pigmentation	*Common Results*
Reinforcing blacks, only.	1. Good dispersion only in heavy loading. 2. Indifferent processing. 3. High moduli.
Reinforcing non-blacks, only.	1. Variable dispersion. 2. Variable processing. 3. Indifferent ability to disperse reinforcing blacks. 4. Light-colored vulcanizates, having less strength than can be obtained with blacks.
Extender non-blacks co-pigmented with reinforcing blacks.	1. Good dispersion and consequently, maximum tensile, tear, etc., in low and medium volume loadings. 2. Good processing without recourse to excessive softener. 3. More rapid break of GR-S (or GR-N) without undue recourse to temperatures which may degrade the elastomer's potentialities. 4. An opportunity for lowered heat build-up. 5. Lowered volume costs.

Note: This article was presented before the Spring Meeting of the Division of Rubber Chemistry, A.C.S., New York, N. Y., 1944.

* Now conducting his own research and service laboratory at 11 Windsor St., Cambridge, Mass.

TABLE I

GR-S	100.
Zinc Oxide	5.
Sulfur	1.5
Santocure	1.5
Stearic Acid	2.0
BRT #7	6.0
Cabot E.P.C. #9	as indicated
Atomite	as indicated

Parts of Pigment	Cure @ 292°F.	Stress @ 500%	Tensile	Elong.	Hdns.	Tear	Tor. Hyst.
20 E.P.C. #9	60′	810	1540	650%	55	88	.110
20 E.P.C. #9, 30 Atomite	30′	630	1740	720%	55	136	.166
30 Gastex	30′	820	1230	615%	56	100	.106

We shall also present a method of evaluating the non-black extender pigments insofar as their ability to facilitate co-pigmentation is concerned.

In passing, it may be helpful to briefly discuss other means of making use of non-black pigments. By the co-use with non-black pigments, of considerable quantities of solid high melting point thermoplastics, such as Gilsonite, coumarone resins, etc., a substantial improvement in tensile strength of GR-S can be brought about. This has been described by Kemp, Ingmanson, Howard and Wallder *(1)*, and certain manufacturers of coumarone resins. Tensile strengths of 1,000 to 2,000 pounds per square inch may thus be realized. Although some of these compounds are usable for insulations on wire and are useful in obtaining light-colored vulcanizates from GR-S, their physical properties fall short of those of similar natural rubber compositions.

History of Co-Pigmentation

In order to obtain vulcanizates whose properties approach those of natural rubber, it became evident during the early development of GR-S compounding that carbon black pigments should be employed to physically reinforce the weak copolymer structure. The channel blacks gave the greatest reinforcement, but their use as the only pigment frequently led to poor processing. Large proportions of softener are frequently employed to correct this poor processing. Unfortunately, this copious use of softeners lowered the strength of the product. This dilution in strength was particularly evident when low volumes of carbon black were employed as the sole pigment.

At the outset, little attention was given to the use of extender and reinforcing pigments until Amon and Wilkes *(2)*, in their work with GR-S, demonstrated that the co-use of a water-ground calcium carbonate with low volumes of a reinforcing black led to substantial improvements in processing and physical properties over those stocks employing the black pigment alone. The basic formula they used was that given in Table I.

Co-Pigmentation at Various Loadings

The benefits of co-pigmentation shown by Amon and Wilkes have been confirmed by the present author and are now extended over a considerably broadened range of ratios of pigments and by increased pigment loadings. Chosen to demonstrate this practice are the same pigments used by the original investigators, namely, an easy processing channel black and a water-ground calcium carbonate. The black is typical of that commonly used and the extender pigment is an ultra-fine calcium carbonate made by grinding sugar calcite in water and fractionating by centrifuge to a weight mean diameter of 2.5 microns. Incidentally, the particle size of this calcium carbonate is almost identical to that of a well-known thermal black.

If one desires to obtain the maximum benefits of co-pigmentation at various loadings, a three-step process of mixing should be followed, either in the laboratory or in the factory. These three steps are:

1. The extender pigment should be introduced during the "break" of the GR-S.
2. After the required plasticity or break has been obtained, the black is added and dispersed in this highly tractive mix.
3. Only after the black has been satisfactorily dispersed, is the softener added. If high loadings of black are called for, it may be necessary to introduce a portion of the softener to "carry in" the last of the black.

These milling procedures resulted from an extended investigation. Previously it had been noted that the time of milling required to reach the required elasticity or break varied with different shipments of GR-S. However, by early introduction of the extender pigment into the Banbury during the break of the GR-S, or upon the mill just after the rubber "laces up," it was found that variations in required time for plasticization of different batches of GR-S were minimized. Also noted was a shortening in the time required to achieve the desired plasticity.

These findings may well prove useful in the rubber

TABLE II

GR-S	100.
Zinc Oxide	2.
Pine Tar	5.
Bardol	5.
Sulfur	2.
Santocure	1.25
Cabot #9 E.P.C.	10.-125.
W.G. $CaCO_3$	10.-150.

Laboratory Milling Procedure

Laboratory mill 6x12″—ratio 1:1.43
Cooling water at 52° F.
Batch size is formula given in grams, multiplied by 4
Press cures at 292° F.

Cycle	Milling Time (min.)	Temp. °F.	Mill Setting
1. Break GR-S until it "laces up"	2		0.040″
2. Add extender pigment and sulfur	3	115	
3. Continue break, cutting in 3 times	5		gradually open the mill to
4. Add carbon black (a little softener only is needed)	7–11	135–145	maintain
5. Add softeners	2		small
6. Add zinc oxide and accelerator	2		bank
7. Cut in 6 times each way and end for end, each way	3	140	
8. Refine twice through a tight mill	2		0.015″
9. Sheet off	1	140	0.08″
TOTAL TIME	27–31		
10. Cool in a moisture conditioned cabinet for 24 hours			
11. Remill on a cool mill		130	
Loosen mill	5*		small bank
Tighten mill, end roll	5		0.020″
Loosen mill and sheet off	5		

* Or less.

TABLE III

(E.P.C. Black 10, with W.G. $CaCO_3$ 0-90, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	10.
$CaCO_3$ W.G.	0.-20.-30.-50.-90.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 500%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
10	0	605	690	680%	42	70	.078	5.6
10	20	680	820	730%	43	85	.085	13.0
10	30	710	930	745%	44	87	.091	16.7
10	50	710	930	720%	46	83	.101	24.1
10	90	685	900	690%	48	80	.123	38.9

Note: The data in Tables III to XI were selected from the best in a series of cures at 15, 30, 60 and 90 minutes.

TABLE IV

(E.P.C. Black 20, with W.G. $CaCO_3$ 0-125, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	20.
$CaCO_3$ W.G.	0.-20.-40.-60.-90.-125.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 500%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
20	0	740	1205	680%	45	90	.085	11.1
20	20	675	1590	730%	48	98	.094	18.5
20	40	750	1785	730%	50	105	.106	25.9
20	60	780	1605	710%	53	115	.118	33.3
20	90	770	1240	660%	55	107	.133	44.4
20	125	710	970	600%	55	105	.147	57.4

TABLE V

(E.P.C. Black 30, with W.G. $CaCO_3$ 0-150, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	30.
$CaCO_3$ W.G.	0.-15.-30.-60.-100.-150.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 400%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
30	0	800	2190	640%	53	170	.110	16.7
30	15	860	2380	670%	55	190	.115	22.2
30	30	920	2300	680%	55	205	.121	27.3
30	60	930	1930	650%	57	185	.132	38.9
30	100	910	1510	600%	58	167	.149	52.4
30	150	900	1010	510%	58	160	.172	72.3

TABLE VI

(E.P.C. Black 40, with W.G. $CaCO_3$ 0-140, per GR-S 100)

GR-S	100.
Zinz Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	40.
$CaCO_3$ W.G.	0.-20.-40.-75.-110.-140.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 400%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
40	0	1560	2810	580%	60	250	.135	22.2
40	20	1470	2860	620%	61	290	.153	29.6
40	40	1410	2525	620%	63	282	.160	37.0
40	75	1360	2010	580%	65	240	.177	49.9
40	110	1060	1635	525%	67	205	.192	63.0
40	140	1020	1230	470%	67	195	.203	74.0

TABLE VII

(E.P.C. Black 60, with W.G. $CaCO_3$ 0-120, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	60.
$CaCO_3$ W.G.	0.-20.-50.-75.-100.-120.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 400%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
60	0	2110	3140	450%	66	305	.196	33.3
60	20	2240	3300	505%	68	325	.221	40.4
60	50	2470	2830	500%	71	340	.238	51.9
60	75	2000	2400	460%	73	310	.253	61.1
60	100	1890	2080	430%	74	260	.261	70.3
60	120	1630	1790	425%	75	230	.271	77.7

Table VIII

(E.P.C. Black 80, with W.G. $CaCO_3$ 0-140, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	80.
$CaCO_3$ W.G.	0.-20.-40.-75.-100.-140.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 200%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
80	0	1940	2940	300%	80	350	.255	44.4
80	20	1780	2920	350%	81	360	.267	51.8
80	40	1690	2830	380%	82	340	.282	59.1
80	75	1580	2300	345%	82	290	.311	72.2
80	100	1560	2000	330%	82	275	.328	81.5
80	140	1510	1560	290%	81	235	.352	96.2

TABLE IX

(E.P.C. Black 100, with W.G. $CaCO_3$ 0-125, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	100.
$CaCO_3$ W.G.	0.-30.-60.-90.-125.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 200%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
100	0	1530	2715	245%	85	300	.325	55.6
100	30	1480	2620	270%	87	330	.348	66.7
100	60	1410	2280	260%	89	325	.364	77.8
100	90	1380	1910	250%	90	300	.370	88.9
100	125	1300	1500	230%	90	270	.381	101.9

TABLE X

(E.P.C. Black 125, with W.G. $CaCO_3$ 0-140, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Cabot #9	1.25
$CaCO_3$ W.G.	0.-20.-50.-90.-110.-140.

Press Cures @ 292° F.

By Wt. Black	Parts $CaCO_3$ W.G.	Modulus @ 100%	Tens. Str.	Elongation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Vol. Loading
125	0	1440	2580	160%	91	290	.409	69.5
125	20	1410	2430	180%	94	330	.412	76.9
125	50	1390	2200	185%	95	320	.418	88.0
125	90	1330	1700	175%	94	275	.422	102.3
125	110	1290	1470	165%	95	260	.428	110.3
125	140	....	1160	150%	95	240	.436	121.5

TABLE XI

(Soft Blacks 20-125, per GR-S 100)

GR-S	100.
Zinc Oxide	3.
Bardol	5.
Pine Tar	5.
Sulfur	2.
Santocure	1.25
Thermal Black (Thermax)	20.-125.
or S.R. Furnace Black (Gastex)	20.-125.

Press Cures @ 292° F.

Thermal Black Type

Black	Modulus @		Tens. Str.	Elong-ation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Volume Loading
20	400%	n.t.	510	560%	40	40	.072	11.1
30	400%	490	630	480%	42	42	.081	16.7
40	400%	580	910	515%	45	52	.093	22.2
60	400%	670	1730	460%	55	105	.099	33.3
80	300%	710	1710	405%	58	158	.105	44.4
100	200%	515	1525	385%	61	179	.122	55.6
125	200%	620	1510	340%	64	184	.131	69.5

S. R. Furnace Black Type

Black	Modulus @		Tens. Str.	Elong-ation	Shore Hdns.	Cresc. Tear	Tor. Hyst.	Total Volume Loading
20	400%	475	910	610%	51	64	.096	11.1
30	400%	615	1190	590%	53	78	.104	16.7
40	400%	840	1510	600%	56	110	.110	22.2
60	400%	1110	1810	490%	64	159	.125	33.3
80	300%	1700	2000	405%	68	180	.140	44.4
100	200%	1690	2130	300%	73	210	.157	55.6
125	200%	1910	2110	270%	77	225	.170	69.5

factory. Any procedure which will not only shorten milling time, but permit plasticization at lower temperatures, must surely be useful to the industry where too often the practice has been to use excessively high temperatures to compensate for limited milling equipment.

Recommendations that the softener be added early have been investigated and found unwise. No softener was found which would freely coat every pigment particle unless considerable pre-mixing and kneading was practiced. Early addition of the softener usually tends to cause the softener to coat and thus lubricate a group or agglomerate of particles. Many of these lubricated agglomerates subsequently become isolated in the compound. The tractive forces which will break open the agglomerate are thus inhibited and effective dispersion diminishes. During subsequent stress of the vulcanizate, the elastomer has to bridge over an agglomerate just as it would over an unduly large, or grit-like, individual particle. Thus, a good reinforcing pigment largely becomes little more than a poor filler.

Chemical plasticizers, which are often added early, may also achieve their purpose equally well if added after dispersion has been obtained. Thus, in general, it appears that softeners introduced largely after dispersion is obtained, achieve their true level of well-recognized usefulness and, by this means, truly good softeners may be recognized.

In the present work, the formula and laboratory milling procedure shown in Table II was used. The formula indicated is similar to that shown in Table I. From these formulations approximately seventeen hundred test results were obtained. Selected results from these are shown in Tables III to X.

Believing there might be combinations shown herein, such as would advantageously parallel similar loadings of typical thermal and furnace blacks, paralleled loadings of these blacks were compounded and tested. The formulae used and results obtained are shown in Table XI.

Method of Using the Graphs

Analysis of the first-named test results seemed to reveal an interesting pattern. This pattern appeared when the bilinear contour graph, shown in Fig. 1, was constructed.

The graph is not difficult to use. Shown upon the vertical axis are the pounds of E.P. channel black, and upon the horizontal axis the pounds of extender pigment to be co-pigmented with the black; these together are used to reinforce each 100 pounds of GR-S.

The somewhat broadened lines which rise slightly from the left-hand side and sweep to the right with a slight descent represent the elongations to be expected. The narrower lines, which largely slope to the right as they descend from the top and then rather abruptly sweep to the left, signify different levels of tensile strength.

When using this graph, one may interpolate. Thus, for example, should one wish 1700 p.s.i. tensile, this level of tensile strength should be chosen midway between the 1600 and 1800 lines. If this strength is to have an elongation of 650%, such may be approximated midway between 600% and 700% elongation curves. Careful examination will reveal that the 1700-650% ratio may be achieved by two different pigmentations: A—E.P.C. black (28 lbs.) and W.G. $CaCO_3$ (75 lbs.) or B—E.P.C. black (25 lbs.) and W.G. $CaCO_3$ (none). It is probable, because of the improved dispersability of the black, the co-pigmented formula "A" will yield better tear resistance than will pigmentation "B".

Considerable modification of these results can be achieved by variation in the type and proportion of softener and curing agent. Thus applying one's own

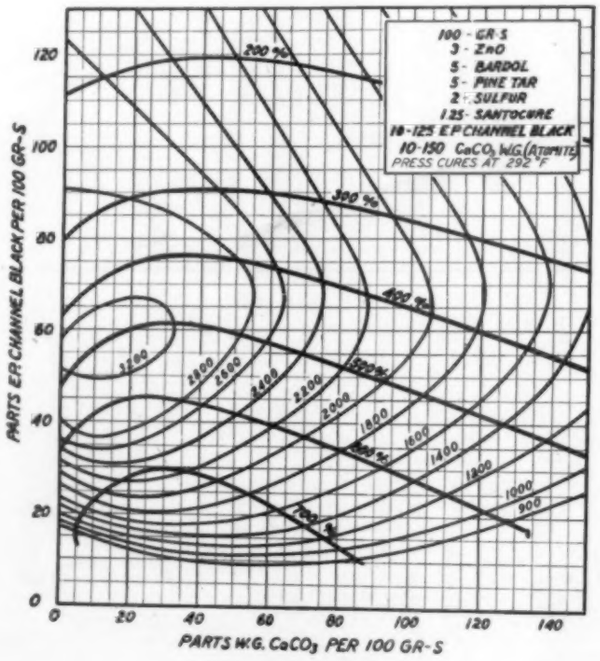

FIG. 1—Bilinear Graph.

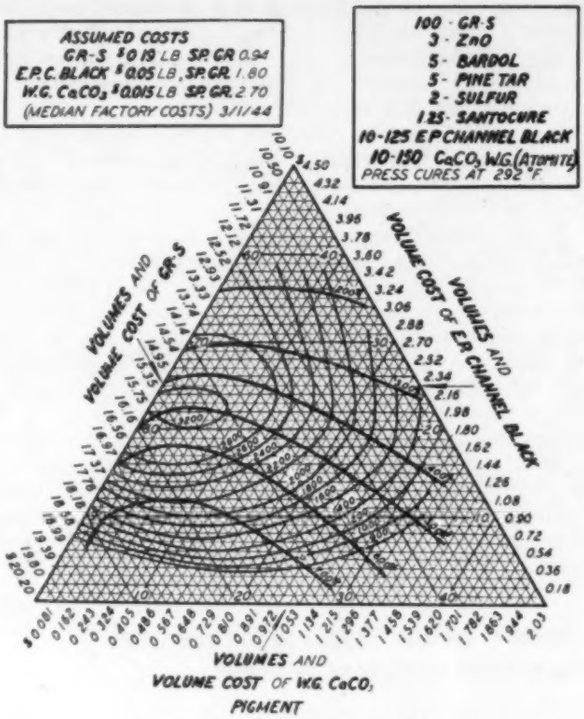
ASSUMED COSTS
GR-S $0.19 LB SP. GR 0.94
E.P.C. BLACK $0.05 LB, SP. GR. 1.80
W.G. CaCO3 $0.015 LB SP. GR. 2.70
(MEDIAN FACTORY COSTS) 3/1/44
100 - GR-S
3 - ZnO
5 - BARDOL
5 - PINE TAR
2 - SULFUR
1.25 - SANTOCURE
10-125 E.P.C. CHANNEL BLACK
10-150 CaCO3 W.G. (ATOMITE)
PRESS CURES AT 292 °F
VOLUMES AND VOLUME COST OF GR-S
VOLUMES AND VOLUME COST OF E.P. CHANNEL BLACK
VOLUMES AND VOLUME COST OF W.G. CaCO3 PIGMENT

FIG. 2—Trilinear Graph.

experience and judgment when seeking to modify hardness, aging, rapidity of cure, etc., one may find this graph useful in designing basic formulations of GR-S and pigments. Being designed upon the familiar practice of apportioning weights of pigments to each 100 pounds of rubber, this graph does not easily adapt itself to rapid estimation of volume costs.

The trilinear graph (Fig. 2) permits estimation of the cost of the rubber as well as of the pigments. Each ordinate is subdivided into percentages and opposite the percentage is shown the appropriate dollar cost. Thus, the cost of 100 volumes of GR-S, black and W.G. $CaCO_3$, such as may be expected to give a 1700 p.s.i. and 650% elongation, will be revealed as:

71 volumes GR-S	$14.34
10 volumes E.P.C. black	.90
19 volumes W.G. $CaCO_3$	.77
100 volumes	$16.01

To determine the volume costs of the rubber and the single pigment, *i. e.*, furnace or thermal black, used to obtain the results shown in Table XI, a more simple graph is possible. This is shown in Fig. 3 where, for example, the rubber and pigment necessary to obtain 100 volumes of a vulcanizate with 1450 p.s.i. tensile and 600% elongation would cost:

84 volumes GR-S	$16.96
16 volumes furnace black	1.37
100 volumes	$18.33

Discussion of the Data

The effectiveness of the extender pigment used in these formulations is most apparent when 30 volumes or less of black are used. When upwards of 30 volumes of black is co-pigmentated, tensiles and tear strengths are proportionately reduced. However, in these higher loadings the extender pigment continues to aid the dispersion of the black but the benefit becomes less obvious. Lower moduli and better elongations are achieved in these higher loadings than would be realized when formulating to an equivalent hardness with the black only.

TABLE XII

	Volume	Weight (lbs.)	Pigment	Vol. GR-S	Tens.	Elong.	100 Vol. Costs
A	10	18	E.P.C. Black	90	1400	675%	$19.08
B	15	27	S.R.F. Black	85	1400	600%	$18.35
C	{ 7½	13.5	E.P.C. Black }	72	1400	675%	$16.02
	{20½	55.5	W.G. $CaCO_3$ }				

One very significant advantage of the extender pigment is not evident in these data. This advantage lies in its ability to aid processing. This characteristic is best perceived in the factory.

More intensive study of Tables III to X and the contour graph, Fig. 1, makes it apparent a given stress-strain property may often be achieved by either the black alone or by a combination of the black and the extender pigment. Frequently, when considered upon the basis of equal tensile strength, the co-use of the pigments results in an increased elongation. Further, it will be seen that increased tear and lower modulus may thus be obtained.

This co-use of extender and E.P.C. black will permit one to duplicate a given stress-strain characteristic previously thought obtainable only with various types of soft blacks.

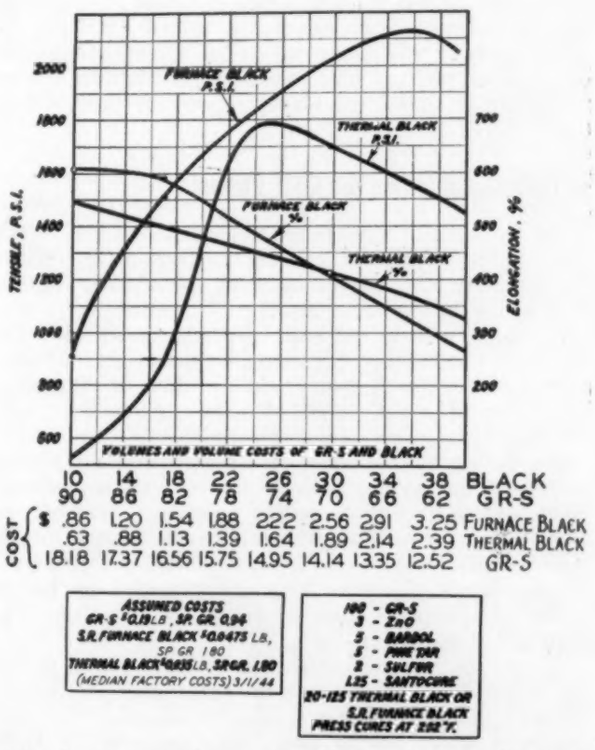
TENSILE, P.S.I.
ELONGATION, %
FURNACE BLACK P.S.I.
THERMAL BLACK P.S.I.
FURNACE BLACK %
THERMAL BLACK %
VOLUMES AND VOLUME COSTS OF GR-S AND BLACK
10 14 18 22 26 30 34 38 BLACK
90 86 82 78 74 70 66 62 GR-S
COST
$ .86 1.20 1.54 1.88 2.22 2.56 2.91 3.25 FURNACE BLACK
.63 .88 1.13 1.39 1.64 1.89 2.14 2.39 THERMAL BLACK
18.18 17.37 16.56 15.75 14.95 14.14 13.35 12.52 GR-S
ASSUMED COSTS
GR-S $0.19 LB, SP. GR. 0.94
S.R. FURNACE BLACK $0.0475 LB, SP. GR. 1.80
THERMAL BLACK $0.035 LB, SP. GR. 1.80
(MEDIAN FACTORY COSTS) 3/1/44
100 - GR-S
3 - ZnO
5 - BARDOL
5 - PINE TAR
2 - SULFUR
1.25 - SANTOCURE
20-125 THERMAL BLACK OR S.R. FURNACE BLACK
PRESS CURES AT 292 °F.

FIG. 3—Volume Costs of Rubber and Single Pigment.

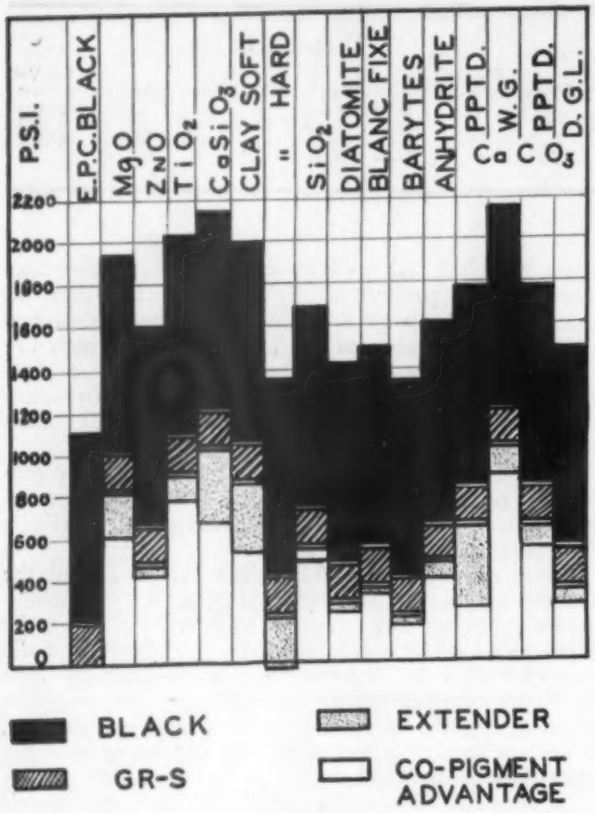

FIG. 4—Tensile Advantage of Co-Pigmentation (11.1 vols. of black and extender pigment).

In general, when high elongations and low moduli are desired in a black GR-S vulcanizate such can be obtained more advantageously with a co-pigmentation of extender pigment and channel black than by use of a furnace or a thermal black, as may be observed in Table XII.

An Evaluation of Fifteen Non-Black Pigments

As has been demonstrated, when using E.P.C. black and the water-ground calcium carbonate, the utility of the extender pigment becomes particularly significant at the 11.1 volume loading. Therefore, using this same ratio, seen in the basic formula shown in Table II, fifteen non-black pigments, common and uncommon to the rubber industry, were evaluated. The physical data obtained under identical curing conditions are listed in Tables XIII, XIV and XV.

Predicting the benefits of pigmentation by adding or subtracting averages may be considered an uncommon approach. However, this procedure revealed interesting information and anticipated further potentialities. Eleven and one-tenth volume loadings of the 15 non-black pigments were compounded as before with the exception that the black was omitted. The results are shown in Table XIII.

Thus, by subtracting the individual values shown in Table XIII from those in Table XIV, it became possible to assume the comparative advantage of each extender to the black. These data are listed in Table XV. These differences may be said to represent the reinforcing value of the black as it is influenced by each of the fifteen non-black pigments. It is, of course, realized that magnesium oxide and zinc oxide, although here tested as extender pigments, are not inert and may have influenced the rate of vulcanization.

Fig. 4 represents a graphical representation of the data shown in Table XV. From it one may visualize the advantage of the component increments composing the total tensile strength.

For example: Although the calcium silicate produces a level of 2130 p.s.i., as does the water-ground calcium carbonate, it is, however, apparent that the calcium silicate level is achieved by a greater degree of pigment reinforcement and by a less degree of ability to disperse the black. Averages of the stress at 300%, hardness and torsional hysteresis shown in Table XIII, closely follow the expected mean. Study of these various data brings to light the finding that 14 of the 15 non-black pigments develop more increase in tensile strength or, as we term it, "co-pigmentation advantage," than would be normally expected from the black only. Nine extenders will be seen to improve tear resistance and eight benefit the ultimate elongation.

Influence of Extender Pigments on Co-Pigmentation, Reinforcement and Torsional Hysteresis

From the data presented, two significant potentialities seem to reside in extender pigments. These characteristics appear, on the one hand, to hasten the break of the elastomer, aid dispersion of reinforcing pigments under certain conditions, and improve processing, and on the other hand, to show promise that a reinforcing or semi-reinforcing pigment may be developed which will lessen heat build-up in flexed GR-S vulcanizates. It is believed these potentially useful characteristics are, in turn, influenced by:

TABLE XIII

(Pigmentation: 11.1 Vol. Extender)

Extender	Mod. 300%	Elong.	Tens.	Hdns.	Tear	Tor. Hyst.
MgO(*1*)	230	460%	400	47	62	.094
ZnO(*2*)	175	420	250	45	42	.080
TiO_2(*3*)	225	420	310	42	43	.070
$CaSiO_3$(*4*)	280	530	550	48	85	.125
Clay—Soft(*5*) ...	230	580	540	47	57	.087
Clay—Hard(*6*) ..	260	430	450	46	56	.077
SiO_2(*7*)	200	380	270	42	36	.067
Diatomite(*8*)	180	430	260	47	49	.089
Blanc Fixe(*9*)....	175	420	240	44	33	.066
Barytes(*10*)	175	400	240	43	33	.065
Anhydrite(*11*) ...	180	420	260	44	43	.066
$CaCO_3$ pptd.(*12*)..	190	350	410	44	58	.072
$CaCO_3$ w.g.(*13*)..	190	440	340	43	42	.072
$CaCO_3$ pptd.(*14*)..	180	480	310	43	47	.072
$CaCO_3$ d.g.l.(*15*)..	170	380	290	43	36	.071
E.P.C. Black(*16*).	430	500%	1100	49	96	.092
No Pigment	178	300	178	42	28	.054
Diff.	252	200	922	7	68	.038

(1) Carey Lt. Cal. (2) N.J.Z. XX Red 4. (3) Krebs FF. (4) Silene. (5) Kaolloid. (6) Suprex. (7) Tamms. (8) Dicalite L. (9) Std. Ult. (10) T. W. OCX. (11) Calcibrite. (12) Kalvan. (13) Atomite. (14) Calcene. (15) Witco. (16) Cabot #9.

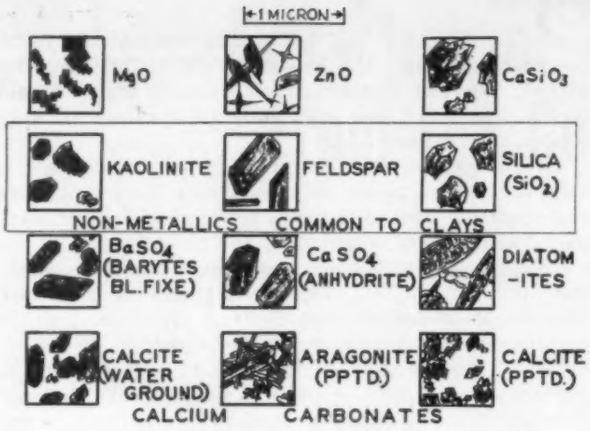

Fig. 5—Crystal Habits of Non-Black Pigments from Electron Micrographs (X 13,565).

1. The maximum, minimum and particle size distribution of the pigment.
2. The shape and structure of the particle.
3. The hardness of the particle.
4. The surface of the particle.

Reference to the following data will reveal the most informative comparisons lie between the calcium carbonates, two of the oxides, the clays and the sulfates.

MINERAL, CRYSTAL AND PARTICULATE HABITS

Mineral	Particle Size +10μ	+2½μ	−1μ	Mho's Hdns.	Shape	Surface
Calcium Carbonate (calcite)						
D.G. Limestone	64%	92%	2%	2½-3μ	rhombs	smooth
W.G. Calcite..	0.5%	50%	25%	2½-3μ	rhombs	smooth
Pptd. Calcite..	from 0.1 to 0.5μ			2½-3μ	rhombs	smooth
Clays						
Soft clay	14%	45%	35%	(The clays are largely quartz,		
Hard clay	9%	24%	60%	feldspar and kaolinite)		
Quartz.....	largely larger than 5μ			7	conchoidal	smooth
Feldspar....	largely larger than 2μ			6	tabular	smooth
Kaolinite ..	largely smaller than 2μ			2¼	plate-like	slippery
Magnesium Oxide	from 0.1 to 1.0μ			5½	cubes	smooth
Titanium Oxide	from 0.1 to 5.0μ			5½	octahedral	smooth
Calcium Silicate	from 0.1 to 2.0μ			5	rhombs	smooth
Calcium Sulfate	from 0.5 to 30.0μ			3	rhombs	smooth
Barium Sulfate						
Ground barite	1.0 to 50μ			3	tabular	slightly
Blanc fixe (pptd.)	0.1 to 15μ			3	tabular	slippery

TABLE XIV

(Pigmentation: 11.1 Volumes E.P.C. Black and 11.1 Volumes Extender)

Extender	Modulus 300%	500%	Elong.	Tens.	Hdns.	Tear	Tor. Hyst.
MgO	510	1210	580%	1940	52	145	.141
ZnO	450	1140	590	1600	52	141	.122
TiO_2	480	1070	680	2025	49	120	.108
$CaSiO_3$	570	1240	640	2130	54	175	.176
Clay—Soft	500	1040	690	1990	51	125	.133
Clay—Hard	500	1010	580	1350	51	122	.114
SiO_2	440	1000	620	1680	49	96	.106
Diatomite	440	1100	540	1410	51	93	.095
Blanc Fixe	450	1070	530	1480	52	110	.101
Barytes	420	890	620	1320	50	104	.105
Anhydrite	420	1050	610	1600	49	120	.102
$CaCO_3$ pptd.*(12)*	480	1010	650	1780	52	160	.119
$CaCO_3$ w.g.	440	940	680	2130	51	135	.112
$CaCO_3$ pptd. *(14)*	430	820	700	1680	51	115	.115
$CaCO_3$ d.g.l. ...	410	860	600	1480	49	96	.112
Average	463	1030	621	1706	51	125	.117
E.P.C. Black ..	430	——	500%	1100	49	96	.092

TABLE XV

(Difference Between Tables XIII and XIV)

Extender	Mod. 300%	Elong.	Tens.	Hdns.	Tear	Tor. Hyst.
$CaCO_3$ W.G. ..	+250	+240%	+1790	+8	+93	+.040
TiO_2	255	260	1715	7	77	.038
$CaSiO_3$	290	150	1580	6	90	.050
MgO	280	120	1540	5	83	.047
Clay—Soft	270	110	1450	4	68	.046
Silica	240	240	1410	7	60	.039
$CaCO_3$ pptd. *(12)*	290	300	1370	8	102	.047
$CaCO_3$ pptd. *(14)*	250	220	1370	8	68	.043
ZnO	275	170	1350	7	99	.042
Anhydrite	240	190	1340	5	77	.036
Blanc Fixe	275	110	1240	8	77	.035
$CaCO_3$ d.g.l.	240	220	1190	6	60	.041
Diatomite	260	110	1150	4	44	.006
Barytes	245	220	1080	7	71	.040
Clay—hard	240	150	900	5	66	.037
Average	261	187	1365	64	76	.039
E.P.C. Black 11.1 Vol.	430	500%	1100	49	96	.092
No Pigment ...	178	300	178	42	28	.054
Diff.	252	200	922	7	68	.038

From these data one might conclude that very large particles (15 microns or larger) and very small particles of extender pigments (0.5 micron or smaller) have their disadvantages. The large particles rupture the vulcanizate upon flexure or stress. The very small particles reinforce if well dispersed, but disperse with difficulty.

A plate-like particle, if low in hardness, *i. e.*, soft, and if having an unctuous, or slippery surface, apparently does not facilitate co-pigmentation. However, these particles, if small and slightly acidic, are known to show relatively good reinforcement when well dispersed.

If the particulate has a hard and thus a harsh texture, it will ameliorate its effect by smallness in dimension, when good co-pigmentation advantages are sought.

The effect of the surface of the particle is not well understood. The effect of surface characteristics would, however, appear to greatly influence usefulness. Acidic surfaces act differently than do those that are slightly alkaline. Blacks appear to induce heat development in proportion to their surface area. The sulfates and calcium carbonates do not appear to thus follow the blacks.

The thermal black and the water-ground calcite tested are of quite similar particulate size and distribution. They show interesting comparisons upon the equal (11.1) volume loading:

	Elong.	*Tensile*	*Hard.*	*Tear*	*Tor. Hyst.*
W.G. $CaCO_3$ (30 lbs.)....	440%	340	43	42	.072
Thermal Black (20 lbs.).	560%	510	40	40	.072

Yet, upon higher volume loadings, the black develops semi-reinforcement not developed by the calcite. However, McMahon and Kemp, "Pigment Incorporation through Latex" *(3)*, infer that the reinforcement to be obtained with calcium carbonates used in GR-S, may be improved by different compounding techniques.

In Table XIII, two significant phenomena appear.

The four calcium carbonates tested developed torsional hysteresis values approximating 0.072. This occurs even though the specific surface of the dry ground limestone, calcium carbonate, is approximately 4,000 sq. ft. per lb., and a $CaCO_3$ precipitate having a particulate diameter, said to be 0.2 microns, develops a specific surface of at least 100,000 sq. ft. per lb.

Examination of thin cross sections of the vulcanizates containing calcium carbonate revealed that the precipitated calcium carbonate is more poorly dispersed than the coarser ground limestone, yet the precipitate must display much more specific surface to the rubber than does the ground limestone.

One may also perceive a similar phenomenon when examining the torsional hysteresis of 0.065 to 0.066 obtained by the use of the three extender pigments, each having sulfate anions. These are blanc fixe, barytes and anhydrite (calcined calcium sulfate). Here again, there is a large difference in range of particulate diameter and specific surface, yet the torsional hysteresis results are substantially identical. Examination of the contours of crystal habits of non-black pigments has, of late, been greatly facilitated by the electron microscope. A comparison is shown in Fig. 5. From these various data one might safely surmise that the character of the surface, rather than contours or specific surface of the non-carbon extender pigments studied, may largely influence the torsional hysteresis they will develop in GR-S.

Conclusions

(1) It is shown that, judged by enhanced physical properties of the vulcanizates in which they are employed, extender pigments have variable ability to aid the dispersion of low and moderate loadings of easy processing channel black.

(2) Improved stress-strain and tear resistance is achieved by the co-use of a selected extender pigment and moderate loadings of easy processing channel black over those results obtained by the black only.

(3) A new method of measuring one of the essential functions of an extender pigment is described. The results obtained from this test are defined as the co-pigmentation advantage of the pigments.

(4) The character of the surface rather than the surface area, or area of particle size, appears to dominate the effect of extender pigments upon the torsional hysteresis of GR-S vulcanizates.

LITERATURE REFERENCES

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(2) Amon and Wilkes, brochure of the Technical Department, Godfrey L. Cabot, Inc., entitled "Replacement of Thermatomic Carbons and Furnace Type Blacks in Rubber Compounds by Decreased Loadings of Channel Blacks and Mixtures of Channel Black and Whiting."

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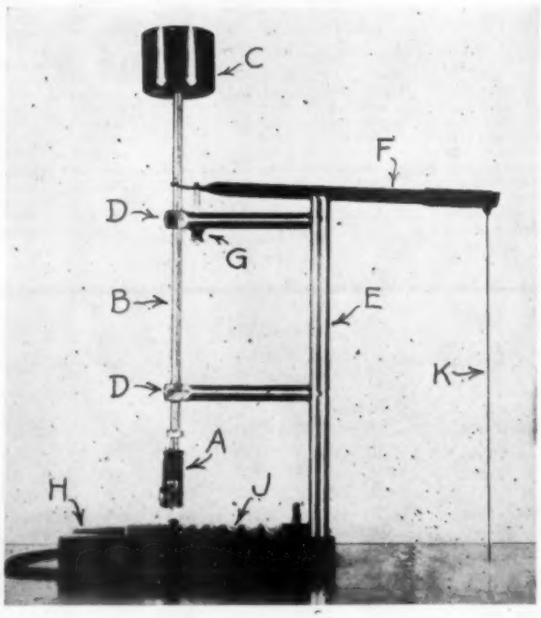
Improved Method for Measuring the Hardness of Rubber*

THE Shore Durometer is the most generally used instrument today for evaluating the hardness of rubber materials. This instrument, for all general purposes, serves the purpose well, but since its performance is dependent on the human element, one operator often secures different readings from another. Therefore, in an attempt to obviate variations in readings between manufacturer and customer, the author has developed the instrument shown in the accompanying photograph. It is possible that the instrument may be of interest to other rubber testing laboratories.

The instrument shown is nothing more than a slotted block used as a base (H) into which a multi-cavity plate (J) fits for testing purposes. The base supports a post or column (E) which in turn supports a rod (B) on the lower end of which the Shore Durometer (A) is attached, with a weight (C) at the upper end. The weight (C) and the rod (B) weigh exactly 3 pounds. In operation, the release of a fork-shaped fulcrum (F), which is actuated by a foot pedal connected to a piece of string (K), raises or lowers the unit comprising the rod (B), the Shore Durometer (A), and the weight (C).

The arms (D) have ball-bearing bearings at the rod connection. This eliminates friction of the bearing. The function of the spring assembly (G), which is connected to the lever (F) and which raises the entire unit or permits it to be lowered, is only for the purpose of withdrawing the lever from the pin in the rod, thereby eliminating any friction which might be created by the lever.

The test plate (J) has numerous cavities or half-round slots to receive any round flanged material. When flat pieces are to be tested, the plate is removed, and turned over, so that the flat surface is uppermost. The plate is anchored in place by a series of holes which center each slot directly under the Shore Durometer by dropping a knurled pin which penetrates the plate and embeds itself into the base.



* Submitted by J. D. Miller, Elkhart Rubber Works, Elkhart, Ind.

Extraction of Resin-Rubber Gum From the Common Milkweed

By N. H. GRACE, J. KLASSEN and R. W. WATSON

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IN native rubber production, Canadian interest, like that of the other members of the United Nations, dates back to events in the Far East following Pearl Harbor. While it was obvious that the great deficiency in the supply of natural rubber could only be met by an extensive synthetic program, it was considered desirable to investigate the possibilities of production of rubber which could be grown in Canada. This involved a survey of native plants for rubber content, the possible cultivation of more promising species, the introduction and study of exotics such as the Russian dandelion, and the technological problems of extraction and rubber quality.

The co-operative research program which was organized involved various government departments and universities. Work during the summer of 1942 indicated that only two species seemed to be of particular Canadian interest, namely, the common milkweed and the Russian dandelion. Obviously, Canadian climatic limitations preclude plants such as guayule and cryptostegia which have been investigated in the United States. Likewise, native goldenrods do not develop much rubber under Canadian conditions. Consequently, since appreciable supplies of Russian dandelion *(kok-saghyz)* were not available, most of the work on extraction was directed to a study of the common milkweed.

The resin and rubber fractions of milkweed as judged by acetone and benzene solubility vary markedly with the stage of development. Dried young leaves have rubber contents around 1%; this value increases to a period just prior to natural leaf fall when the content is of the order of 4 to 4.5% in wild stands. The gross resin fraction also varies somewhat but ranges around 15%. Milkweed stems have little rubber, in amount about 0.4%; the resin content is, however, as high or higher than in the leaves. Extraction studies, therefore, dealt with leaf tissue.

Laboratory Method of Mechanical Extraction

A laboratory method for extraction of a resin-rubber fraction from milkweed leaves was developed. This involved cooking the leaves in dilute alkali, washing out dissolved materials, and finally agglomerating a resin-rubber fraction in a pebble mill. This yielded a soft tacky material containing from 25 to 40% rubber hydrocarbon, 35 to 45% resin, and from 30 to 35% detritus. The detritus, residue insoluble in acetone and benzene, comprised about 40% inorganic material (ash). The organic portion consisted of plant debris. Upwards of 90% of the rubber hydrocarbon may be recovered.

However, the resin extracted in the gum was usually somewhat less than half that calculated from acetone solubility of the original leaves for the alkali cook dissolves a substantial part of the acetone soluble fraction. Losses are associated with cooking and washing rather than with the pebble milling operation. This procedure also effects extraction of gums from seed pod hulls and stems.

The resin-rubber fraction can be concentrated by froth flotation. Cooked, washed leaves are pebble-milled to break down tissues and free resin-rubber. The ground leaves are floated at 1.2% solids, and natural frothers are present in adequate amounts. The concentrates are thickened by settling and the resin-rubber agglomerated by final pebble-milling.

Solvent Extraction Methods

Solvent extraction studies paralleled the experimental work on development of a mechanical method for extraction of resin-rubber from milkweed tissue. Originally, successive acetone and benzene extractions provided resin and rubber from ground plant tissue. Subsequently, the gum obtained by the mechanical procedure described was dried and subjected to similar solvent separation. The benzene extract from both the leaf tissue and the mechanically extracted gum was very tacky and obviously contained a low polymer rubber. The resin and rubber fractions separately, as well as the crude gum, were subjected to a series of blending tests in the rubber laboratory.

Blending with Buna S*

A 15-85 milkweed gum-GR-S mixture in a tire tread compound resulted in an improvement in tack, an increase in the tear resistance, a drop in both tensile strength and modulus, an increase in elongation (notably at overcure), a drop in resilience, but an improvement in the heat embrittlement figure and a considerable improvement in flex life. Resin and rubber hydrocarbon were each blended separately with GR-S. It was indicated that an additional 0.6 parts of sulfur over and above that required by GR-S should be added for each 15 parts of hydrocarbon to equalize rate of cure. Similarly, an addition of 0.25 parts of sulfur above that required by the GR-S was needed for each 10 parts of resin added in order to equalize the rate of cure.

The resin appears to improve heat embrittlement and

* Rubber tests were made by J. R. Sheppard, T. R. Griffith and G. G. Wanless.

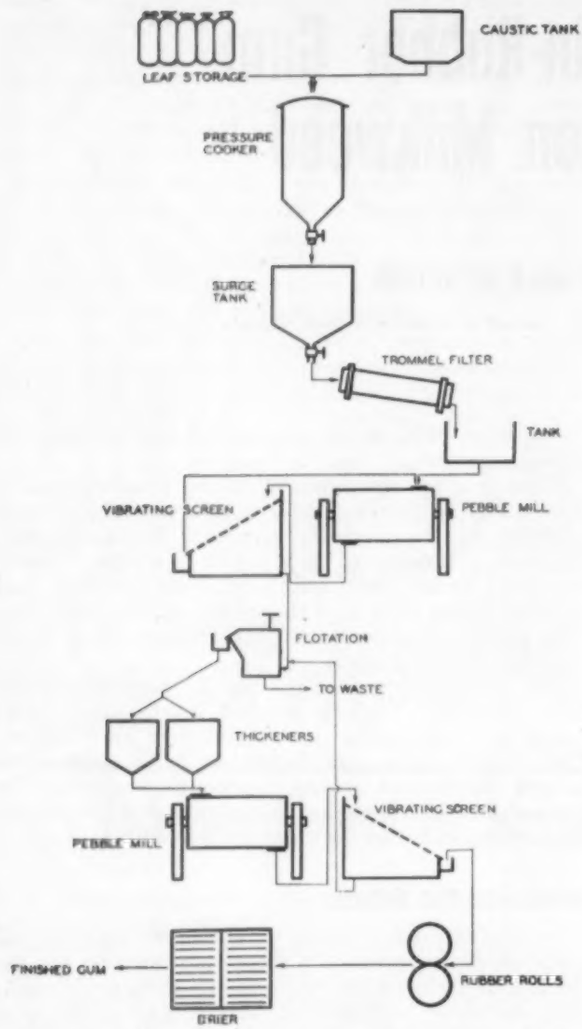

FIG. 1—Milkweed Gum Extraction Flowsheet.

elongation at break after overcure. These are merely laboratory results. It was considered desirable that adequate quantities of milkweed† gum be made available for actual plant scale compounding tests and production of tires. These then could be tested under conditions of practical operation. The extraction of several tons of milkweed gum was the intitial goal of the pilot plant.

Resin-Rubber Gums From Other Plants

Resin-rubber gums have been extracted from a number of plants by procedures developed for the common milkweed. Included among these plants are sow thistle, lactucas, dogbanes and tragopogon. While the yield of rubber hydrocarbon from such plants is low a substantial resin fraction is obtained. The milkweed pilot plant can make substantial extractions on the above and similar plants. Further, these facilities with only minor adaptations in procedure, should permit the satisfactory extraction of rubber from *koksaghyz.*

† Milkweed leaves were collected by school children through a campaign organised by the Department of Agriculture.

Operation of the Pilot Plant

The pilot plant was planned and equipped in such a way as to permit rapid extraction of substantial amounts of gum by the series of batch operations worked out in the laboratory. However, in the plans, provision was made for ultimate integration to continuous operation.

The unit processes in the plant consist of cooking, filtering, washing, pebble-milling, floating, thickening, agglomerating, and drying. The order of processing may be clearly seen on the accompanying flow sheet (Fig. 1). It must be stated however that in spite of the fact that this flow sheet appears to be almost identical to the procedure worked out in the laboratory a great deal of additional information had to be collected before any rubber at all was extracted. The unit processes will, for purpose of clarity, be given step by step as outlined in the flow sheet. Integration to continuous operation has not yet been completed.

Cooking: The plant has two pressure cookers 32" D. × 64" tall with a 45° conical bottom and a 6 inch gate valve in the bottom (Fig. 2). The cooker is heated by direct injection of steam through a 1½" pipe in the conical bottom and has been tested for a steam pressure of 50 pounds. In order to reduce the implosions a small quantity of air may be fed in with the steam.

Each cooker is charged with 80 to 90 pounds of air-dried leaves. Water is added until the cooker is ¾ full. Steam is injected until the boiling point is reached and then turned off until the mass just boils gently. The leaves are well mixed by the bubbling action and thoroughly wetted. After 15 minutes the liquid is drained off through a screen placed above the gate

FIG. 2—The open air and two pressure cookers showing valves and conical bottom.

valve. The gate valve is then shut and the screen removed. The cooker is again ¾ filled with water, commercial NaOH (14 lbs.) is added to make a 1% solution, and steam is admitted until a pressure of 10 to 15 lbs. is attained. After standing for 1½ hours the cook is blown into the surge tank. The whole process requires about three hours.

The water extraction dissolves 40 to 50% of the dry weight of leaves, the extract having a marked brownish color. This water extraction reduces the subsequent alkali requirements and results in better gum recovery. Alkali treatment then dissolves another 10 to 20% of the dry weight of the leaves. The dissolved materials consist mainly of sugars, fats, proteins, hemicellulose, ligno-cellulose, and inorganic salts.

Filtering and Washing: Filtering and washing are actually two separate steps but in the plant they are done together and for that reason they will be discussed together. In the pilot plant gum has not been agglomerated from the leaves unless they have been properly filtered and washed. Substances are present which tend to emulsify the gum; these must first be washed out. Hot filtration is necessary as this substance or substances will precipitate if the cook is allowed to cool. It is therefore immediately fed at a uniform rate from the surge tank into the trommel filter. The trommel filter is provided with a water spray in its central third portion; therefore, passage through the screen will filter, wash, and filter. Technical difficulties were encountered in operation of the first unit.

An improved unit 2 ft. D. × 8 ft. long is being constructed. In this way a product is obtained containing about 90% water and with a pH of 11.2 to 11.8, resembling cooked and drained spinach. It has been found that it is well to keep the pH lower than 11.5 so that any leaves with a higher pH require a second pass. This material has presented a great deal of difficulty in filtering as it very rapidly binds filtering cloths and screens. The most satisfactory medium has been a covering of six layers of cheesecloth and if a sharp spray of water is directed on the reverse side of the cloth, clogging is largely eliminated.

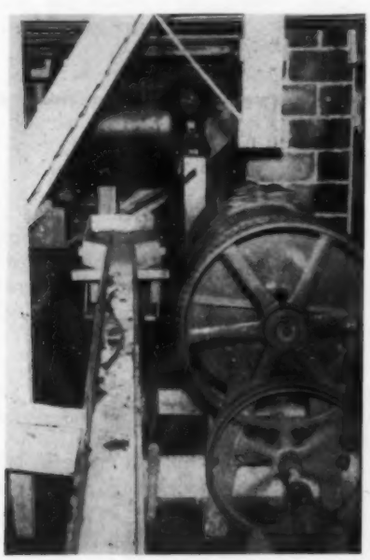

FIG. 3—Two ball mills, with the comminuting Straub mill in the background and the agglomerating Abbe mill in the foreground.

FIG. 4—Flotation cell showing the froth.

Milling: The gum in its natural form is minutely dispersed throughout the leaf tissue as resin-rubber. It is necessary to free the resin-rubber from the cells by a grinding operation which is readily performed by a pebble mill. For this purpose two batch pebble mills are used: one a Vulcan Amalgam Barrel 36″ D. by 48″ long and the other a Straub mill 36″ D. × 36″ long (Fig. 3). Both of these mills have been lined with porcelain brick. The larger mill is charged with 30 gals. of leaves (10% solids) and 30 gals. of water; the smaller 21 gals. of leaves and 21 gals. of water. Both mills are half filled with Saskatchewan flint pebbles. The r.p.m. of the larger mill is 32.5 and of the smaller 37.5.

In this milling there are two factors to be taken into consideration. In the first instance, the action of the pebbles tends to comminute finely the cooked leaves; in the second, the gum is caused to agglomerate. At the beginning of the milling there are very few free resin-rubber particles but milling liberates more and more particles. Therefore, while the grinding action is first rapid and then becomes slower and slower, the agglomerating action is at first nil and becomes faster and faster.

However, these mills have only rolled the gum up to a particle size of a few mm. in diameter, and then only after excessive milling. Yet these particles are too large for good flotation. Obviously then, milling must be stopped at a point which ensures absence of an appreciable number of the larger particles. It has been found that a 3½ hour milling gives the best results. The milled slurry is passed over a 60-mesh Dillon vibrating screen and the oversize (1/7 of the

bulk) goes back to the mill while the undersize goes to flotation.

Flotation: Actual froth and not gravity flotation is used, for the specific gravity of the gum is about 1.15. The flotation machine is a 6 cell Denver Sub-A Unit (Fig. 4). The pulp has an approximate solid content of 1.2 to 1.5%. The milkweed slurry has its own natural frother and no flotation reagents need be used. The frothing properties are dependent on the pH to which the cooked leaves were washed; the higher the pH the more watery and voluminous the froth or gum concentrate becomes. An example of the concentration effected may be seen by the following analysis of the various parts listed in a run:

Flotation Heads—9.6% resin and rubber
Flotation Concentrate—49.1% resin and rubber
Flotation Tails—3.6% resin and rubber

However, the tails are still quite high in resin and rubber, much higher than in laboratory tests, and work is being done to bring down this resin-rubber content.

Thickening: The concentrate from the flotation cell is quite watery and thickening is undertaken for two reasons. A larger dry weight of thickened material may be put into the agglomerating mill and the rate of agglomeration is faster. The method employed has been to fill two tanks alternately and while one is filling the other is settling and being drained.

Agglomeration: Simple rubbing of the concentrate agglomerates resin-rubber. The pebble mill, however, gives excellent agglomeration. Hence, the pebble mill does both the work of agglomeration and of comminution. A porcelain-lined Abbe mill 30" D. × 36" long (Fig. 3) is charged with 25 gals. of the thickened concentrate and the charge heated to the boiling point with steam. The increased temperature helps the gum agglomerate more rapidly. The mill is rotated at about 36 r.p.m. for about 5 hours and at the end of this time most of the gum is the size of wheat kernels and larger.

The charge is dumped through a grating and put over a vibrating 80-mesh screen and the undersize is sent back to the flotation cell while the gum oversize is put back into the agglomerating mill with the remainder of the gum. The mill is half filled with boiling water and rotated for about ½ hour. At the end of this time the gum has all been brought together into one lump, which may then be picked out by hand and may weigh anywhere from 6 to 14 pounds depending on the grade and the amount of feed put into the mill.

FIG. 5—The resin-rubber gum, both crude lump gum out of the ball mill and sheeted dried gum.

Drying: The gum contains 20 to 30% moisture and must therefore be dried before it can be used for compounding. To ensure rapid drying the rubber must be sheeted out. This is easily done on rubber washing rolls where it is worked into corrugated sheets about 1/16 of an inch thick and spread onto wire screening. These laden screens are set into either a vacuum or air drier. The warm air drying oven is kept at 60° C., and requires 3 to 4 days to take the moisture down to 0.5 to 1%. Vacuum drying may possibly be better because there would be less oxidation of the rubber fraction. Atmospheric equilibrium moisture content at 30-40 R.H. is about 2% so that there is not much point in drying below this unless the gum is to be used right away. The dried gum is then ready for use. Sheeted dried gum, as well as crude lump gum out of the ball mill, is shown in Fig. 5.

An Odd Use for Rubber Sheeting

FROM time to time odd uses for rubber products of various nature are reported in the news. One of these was recently revealed by the Glenn L. Martin Co., Baltimore, Md. By substituting rubber sheeting for grease on the blocks of stretching machines, an improvement in practically every phase of processing large metal sheets into airplane "skins" has been achieved at the Martin plant.

Before the 1/32-inch thick elastic "lubricant" was adopted, operators of the stretching machines covered the blocks with a thick coating of the grease. After the "stretching" process was completed the sheets were placed on the floor where a second group of employees removed as much of the grease as possible with rubber scrapers and wiping cloths.

Following this cleaning work the sheets were taken to a scribing table, followed by trimming and cutting out of sections. Because those sections had a burred edge after being cut, they were moved along to another group who removed those burrs with scraping tools and file. When these operations were completed, the parts were moved into a hot vapor bath pit where the grease was removed. Then the parts were numbered and, after being loaded into containers or on skids, they were sent to other departments for finishing operations.

With the adoption of the rubber sheeting method production immediately soared, Frank Weisner, foreman of the Stretching Machine Department explained. "The new plan saved production costs in a number of ways," he said. "Our total department output was increased almost 50 per cent. In addition we saved the excess cost of the grease which was much more expensive than the rubber sheeting, the machines and tools do not have to be cleaned each shift, we eliminated a number of safety hazards, we keep the department much cleaner, and we're doing more work with fewer people."

Replacement of Easy Processing Channel Black With Medium Processing Channel and Semi-Reinforcing Black

By LEONARD H. COHAN

Research Labs., Continental Carbon Co., Chicago, Ill.

IN the last few months the supply of easy processing channel (EPC) has been insufficient to meet the demand. To determine whether a mixture of medium processing channel (MPC) and semi-reinforcing furnace (SRF) could be used in place of EPC, mixtures of MPC and SRF were compared with EPC in a natural rubber and a GR-S tread formulation. The results indicate that on the basis of laboratory tests a mixture of approximately 90% MPC and 10% SRF is a good substitute for if not actually superior to EPC in the test formulas used. The adoption of such a blend would not only ease the shortage of EPC but would also allow an increase in the total production of the channel black industry since MPC can be produced in appreciably higher yield than EPC. The blacks used in this study are listed in Table I.

Natural Rubber Formulation

Tests were made in the following tread type test formula cured at 280° F. (A.S.T.M. standard conditions were used except where otherwise noted):

Smoked sheet	100.00
Zinc oxide	7.85
Pine tar	3.00
Stearic acid	3.30
Sulfur	2.81
Mercaptobenzothiazole	0.743
Carbon black	50.50

TABLE I—PHYSICAL PROPERTIES OF CARBON BLACKS

Black	Type	% Volatile[a]	% DPG[b]	% I_2[c]	% I_2[c] (black devolatilized)	Color Index	Estimated Average Particle Diam. (mμ)
Continental AA	EPC	5.0	35	46	65	60	33
Continental A	MPC	4.5	40	49	70	85	26
Continex SRF	SRF	0.6	1.3	12.7	13.0	<15	80

(a) Johnson, C. R., *Ind. Eng. Chem.*, Vol. 20, p. 904 (1928). (b) Amon, F. H., and Estelow, R. K., *Ind. Eng. Chem.*, Vol. 24, p. 579 (1932). (c) Cohan, L. H., and Steinberg, M., *Ind. Eng. Chem. (Anal. Ed.)*, Vol. 16, pp. 15-20 (1944).

Detailed rubber properties are listed in Table II. Carbon black blend compositions are given as per cent of total carbon black at the top of the table and likewise in Figures 1 to 4. Results are plotted in the figures for the 60 minute cure for the stocks containing channel black and the 45 minute cure for the stock containing only Continex SRF, except where otherwise indicated. Variation in a given physical property of the blends as a function of their composition is indicated by the solid line. The broken line indicates the corresponding value for Continental AA.

Stress-strain Behavior: The maximum tensile values

TABLE II—NATURAL RUBBER

Carbon Black, % of Total Black	Cure (min.)								
Continental AA		100	....	....	....	....	....	....	....
Continental A		....	100	95	90	85	70	30	....
Continex SRF		....	....	5	10	15	30	70	100
Modulus at 400% elongation, lb./sq. in.	15	1125	1100	900	900	700	875	1100	1500
	45	1825	2000	1950	1850	1775	1775	1875	2100
	60	2275	2225	2025	2025	2000	2000	1950	2300
	90	2475	2475	2400	2300	2325	2125	2200	2400
Tensile at break, lb./sq. in.	15	2400	2325	....	2500	2200	2300	2625	3100
	45	3925	4125	4200	4000	4050	3700	3800	3275
	60	4050	4375	4050	4100	4075	4050	3800	3275
	90	3950	4325	4150	4200	4100	3875	3600	3125
Elongation at break, %	15	645	630	665	655	650	665	610	605
	45	615	630	635	640	640	630	600	550
	60	580	610	600	630	610	615	590	505
	90	545	575	570	580	600	580	555	480
Tensile ratio		.59	.53	....	.59	.54	.57	.69	.95
Durometer at 25° C.	15	53	52	56	56	52	52	52	54
	45	65	65	62	64	61	61	59	62
	60	66	66	65	65	66	63	61	62
	90	67	69	66	66	67	63	60	62
Tear, lb./in.	45	....	....	....	....	....	....	625	350
	60	800	980	875	835	795	790	625	410
	90	755	825	830	750	775	700	625	510
Rebound at 25° C., Bashore, %	45	....	....	....	....	....	....	50	55
	60	39	37	38	38	39	42	50	54
	90	38	38	38	39	39	43	51	....
Rebound at 100° C., Bashore, %	45	....	....	....	....	....	....	....	70
	60	54	53	53	55	56	57	65	70
	90	53	53	54	54	56	58	66	....
Heat build-up,[a] °F.	85	328	379	343	319	308	252	191	169
Abrasion loss, Grasselli, cc./hp.-hr.	60	189	183	160	176	162	177	145	125
	90	145	138	130	124	127	131	128	141
	120	151	139	117	103	115	123	132	156
Williams plasticity, in.		.163	.179	.177	.167	.156	.139	.120	.112
Tubing rate,[b] gm./min.		35.5	32.2	34.0	35.2	34.8	36.4	40.0	39.2

(a) Temperature rise as measured at center of plug at end of thirty minutes on the St. Joe Flexometer; 565 pound vertical load, .175 inch horizontal deflection, 875 R.P.M. (b) One-half inch Royle Tuber, using $\frac{1}{16}$" die, 24 R.P.M. screw speed, and 170° F. barrel temperature.

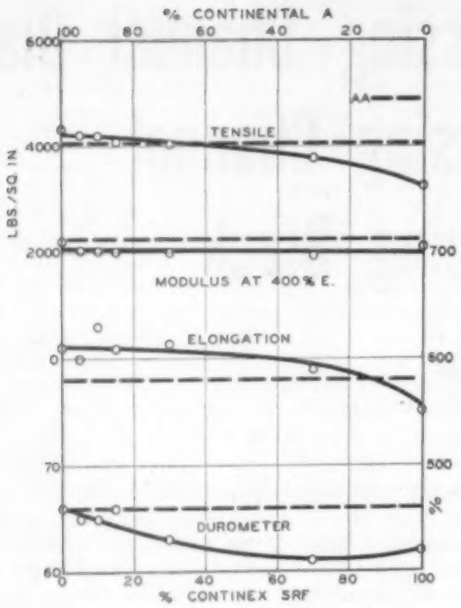

Fig. 1

are plotted in Fig. 1. Tensile strength of the Grade A-Continex SRF blends falls off slowly as Continex SRF is increased and is as good or better than Grade AA up to 15% SRF.

Modulus decreases slightly with increasing per cent SRF. The high value for the 100% Continex SRF appears to be due to the fact that the optimum cure for this stock is actually somewhat lower than the 45 minute cure used in Fig. 1. As indicated below, this stock cures considerably faster than any of the other stocks.

Except for the Continex SRF stock the blends all have greater elongation than AA.

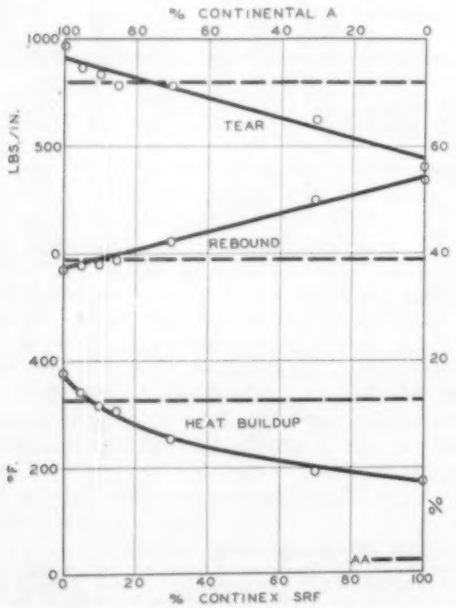

Fig. 2

Rate of Cure: The tensile ratio (tensile strength at 15 minute cure/maximum tensile) indicates increasing cure rate with increased Continex SRF loading. However, up to 30% SRF the cure rate is not increased markedly.

Durometer: Durometer decreases slightly with the addition of Continex SRF and is a degree or so lower than AA for the blends as shown in Fig. 1. The slight increase in durometer for the 100% SRF stock, like the modulus, can be attributed to inadequate adjustment for rate of cure.

Tear: Tear strength for the 60 minute cure drops markedly (Fig. 2) with decreasing Continental A, but is better than AA for blends containing 85% or more Grade A.

Rebound and Heat Build-up: Rebound increases very sharply at both 25° C. and 100° C. with increasing Continex SRF (Table II). Fig. 2 shows that about a 12% SRF blend matches AA in rebound at 25° C. From Table II it can be seen that even less SRF is needed to match AA for rebound at 100° C.

In Fig. 2 the effect of increased Continex SRF on the heat build-up of the 85 minute cures is also shown. From the intersection of the curve with the broken line giving the value for AA we see that 8% or more Continex SRF with Grade A gives a stock which generates less heat than AA.

Abrasion Loss: From the data in Table II the blends appear to show superior abrasion resistance to both A and AA. However, the inadequacies of laboratory abraders are well known and, as indicated by the comparatively low values for the stocks containing 70% and 100% SRF, sometimes give results that are not in line with road tests.

Processing Characteristics: Both Williams plasticity and tubing rate are plotted in Fig. 3. As would be expected the results indicate easier processing the higher the per cent Continex SRF. Between 10 and 15% SRF gives a blend matching AA.

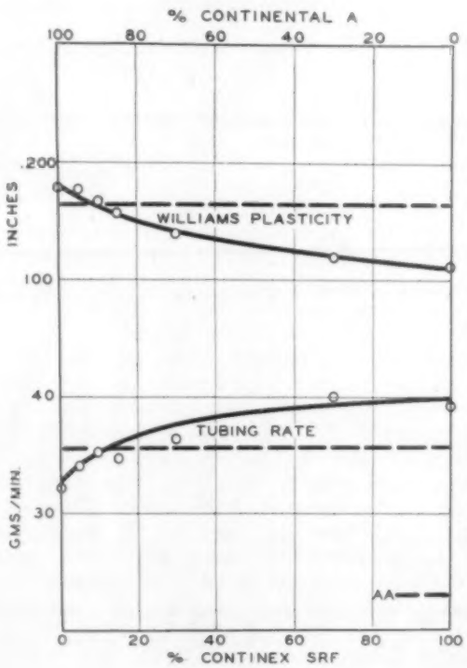

Fig. 3

TABLE III—GR-S

Carbon Black, % of Total Black	Cure (min.)								
Continental AA		100	....	....	....	....	....	....	....
Continental A		....	100	95	90	85	70	30	....
Continex SRF		....	....	5	10	15	30	70	100
Modulus at 400% elongation, lb./sq. in.	15	1100	1000	900	800	925	800	1000	1200
	45	1900	2000	2000	1775	1700	1500	1600	1475
	60	2000	2100	2150	2000	1900	1675	1675	1500
	90	2100	2275	2275	2200	1925	1725	1775	1600
Tensile at break, lb./sq. in.	15	1900	2125	2000	1900	2000	1900	1725	1675
	45	2600	3125	2800	2700	2500	2275	1800	1725
	60	2800	3200	3000	2800	2650	2350	1800	1725
	90	2725	3100	3000	2600	2450	2225	1800	1700
Elongation at break, %	15	590	650	665	635	640	685	610	535
	45	500	540	540	520	500	520	450	455
	60	485	510	500	485	480	480	425	435
	90	450	445	475	435	450	460	415	420
Tensile ratio		.68	.66	.67	.68	.75	.81	.96	.97
Durometer at 25° C., instantaneous	15	64	65	60	61	57	54	52	52
	45	68	69	67	66	61	59	56	54
	60	69	70	69	66	61	60	56	54
	90	68	71	69	66	64	61	57	55
Durometer at 25° C., 30 sec.	15	54	54	49	49	47	44	45	46
	45	59	61	59	58	55	52	49	47
	60	60	61	60	60	55	54	52	48
	90	62	62	62	59	57	54	53	48
Tear, lb./in.	45	....	....	....	380	300	335	200	180
	60	300	320	330	330	335	335	215	165
	90	330	325	305	280	320	300	....	....
Rebound at 25° C., Bashore, %	45	....	....	....	38	37	40	44	47
	60	36	35	36	39	40	41	44	47
	90	36	36	37	38	40	40	....	....
Rebound at 100° C., Bashore, %	45	....	....	....	50	49	51	53	56
	60	48	47	49	51	49	51	53	57
	90	47	48	49	50	49	50	....	....
Heat build-up,[a] °F.	85	238	247	239	238	227	217	205	200
Abrasion loss, Grasselli, cc./hp.-hr.	45	....	....	....	....	....	....	150	190
	60	84	78	83	84	106	144	....	....
	100	79	77	60	78	101	124	142	210
	150	59	59	62	69	74	116	136	207
Cut growth resistance,[b] kilocycles/cm.	75	16.6	10.0	11.5	16.8	20.4	27.7	37.9	41.5
Williams plasticity, in.		.189	.197	.198	.193	.186	.166	.158	.148
Tubing rate,[c] gm./min.		30.6	28.7	28.8	30.9	31.4	30.0	32.5	33.6

(a) Temperature rise as measured at center of plug after 40 minutes on the St. Joe Flexometer; 475 pound vertical load, .130 inch horizontal deflection, 875 R.P.M. (b) Figures are the average of two separate tests on the DeMattia flexing machine (A.S.T.M. D-430-40-B). Results are expressed as the number of kilocycles (thousand flexures) required to increase an 0.2 cm. initial cut to 1.2 cm., i.e., a growth of one cm. (c) Same as for natural rubber (Table II).

GR-S Formulation

The same blacks used in rubber were studied in the following GR-S compound cured at 307° F.:

GR-S	100.0
Zinc oxide	5.0
Coal tar softener	5.0
Sulfur	2.0
Mercaptobenzothiazole	1.5
Carbon black	50.0

Results are plotted in the figures for the optimum tensile cures (45 minutes for 70% and 100% Continex SRF, 60 minutes for all others) except where otherwise indicated. Complete test data are listed in Table III.

Stress-strain Behavior: Tensile, modulus, and elongation decrease with increasing Continex SRF in the blends (Fig. 4). The 10% SRF blend has tensile, modulus, and elongation equivalent to the AA stock.

Rate of Cure: Cure rate increases with increasing Continex SRF as indicated by the tensile ratio in Table III. Cure rate for the blends containing up to 10% SRF is similar to that for AA.

Durometer: As shown in Fig. 4, the 5 and 10%

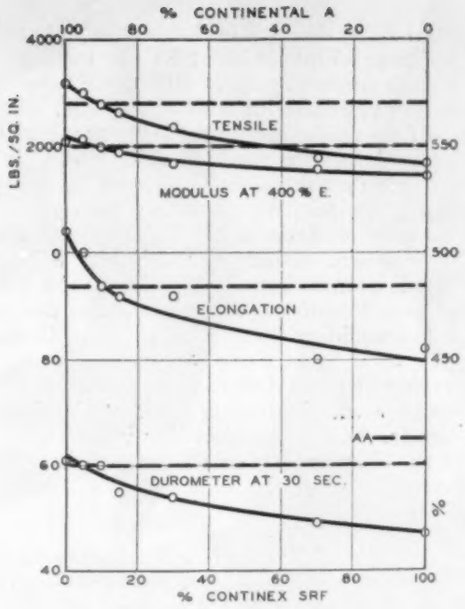

Fig. 4

Continex SRF blends match AA. Higher Continex SRF contents give softer stocks.

Tear: It is rather surprising that as much as 30% Continex SRF can be added to Continental A without reducing the tear resistance in GR-S. At higher SRF contents, tear falls off rapidly (Fig. 5). The blends up to 30% or more SRF are as good or better than AA.

Rebound and Heat Build-up: The results plotted in Fig. 5 show that rebound increases and heat generation decreases with increasing Continex SRF. The heat build-up results are for the 85 minute cure. Only about 5% SRF is necessary to reduce hysteresis loss to that of the AA stock.

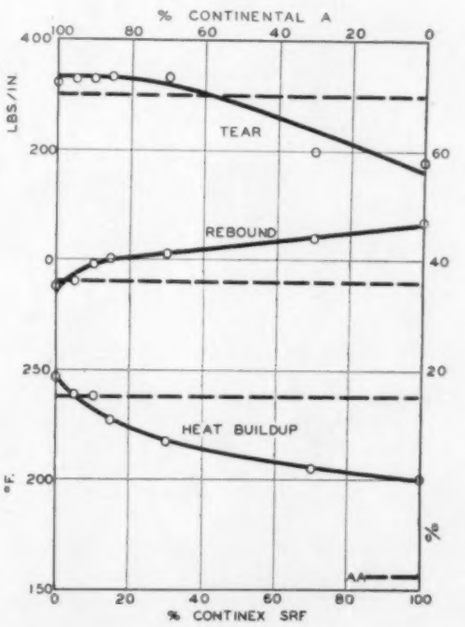

Fig. 5

Abrasion Loss: Results in Table III show abrasion loss to increase with Continex SRF for loadings above 10%. Blends containing up to 10% SRF have equivalent abrasion resistance to both AA and A. The abrasion loss of the stocks containing 70% or more channel black is lower than for similar rubber stocks. It is not felt, however, that these results should be interpreted as indicating comparative road wear values.

Cut Growth Resistance: In Fig. 6 the number of flexures necessary to increase an initial 0.2 cm. cut to 1.2 cm. is seen to increase as Continex SRF loading increases. Results on 75 minute cures are plotted. The stock containing 10% SRF matches Continental AA.

Processing Characteristics: As in rubber, these properties improve with increasing per cent Continex SRF in the blends. About 10% SRF is required to obtain a stock of the same ease of processing as AA.

Summary

The properties of blends of medium processing channel black (Continental A) and semi-reinforcing furnace black (Continex SRF) have been compared with easy processing channel (Continental AA) in typical rubber and GR-S tread compounds. Laboratory test results indicate that a blend of 90 parts Continental A with 10 parts Continex SRF is essentially a match for Continental AA with respect to ease of processing, flex life, and hysteresis loss, while tensile strength and tear resistance are equal or superior to AA.

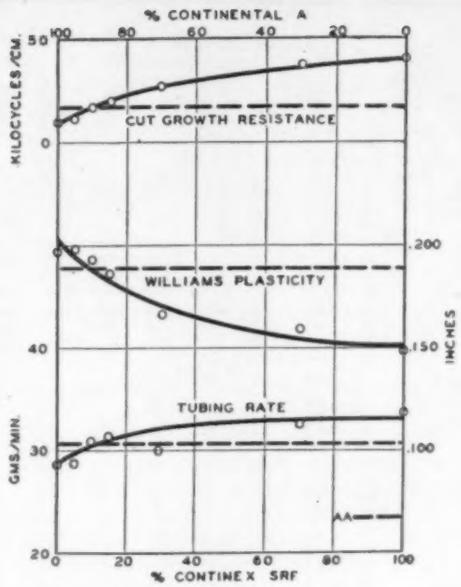

Fig. 6

ACKNOWLEDGMENT

The author acknowledges gratefully the assistance of Beulah C. Myerson, Martin Steinberg, and Francine Weiss in preparing the data and figures.

Bladder-Type Rubber Fuel Cells for Non-Combatant Aircraft

ONE of the newest examples of wartime technology yielding fruit for the days of peace to come is seen by technicians in the development of bladder-type rubber cells for non-combatant aircraft. Although this development has been under experiment for some time, initial details were made available by the B. F. Goodrich Co., Akron, within recent weeks.

The new development, according to James S. Pedler, manager of the aeronautical division of Goodrich, is the outcome of successful experience with bullet-sealing rubber fuel cells, in which his company pioneered and which are being produced in vast numbers for the protection of United Nations war planes. It has been pointed out that peacetime benefits of the rubber gas tank idea may not be confined to airplanes, but that it also may be used effectively in making "crash-proof" gas tanks for buses and trucks.

"The performance of bullet-sealing fuel cells in service on fighting airplanes shows that they not only protect the fuel supply from enemy bullets, but also reduce fuel leakage from other causes, such as structural strains and minor crashes," said Mr. Pedler. He stated that these additional advantages can be provided for non-fighting airplanes by cells that are much simpler and lighter than the combat type, being actually rubber bags or bladders tailored to fit accurately into the spaces between wing supports.

Explaining the advantage of the new fuel cells, Mr. Pedler said that in airplane fuel compartments of the "integral" type, currently standard equipment, the skin of the wing is actually the outside of the fuel tank, with every rivet or seam a potential source of leakage. The constant strain often causes rivets or seams to loosen, not sufficiently to weaken the wings structurally, but enough to allow leakage of fuel. As a result, planes are grounded, schedules disrupted and the source of the leak is often hard to find and difficult to repair.

"Rubber cells will protect a plane's fuel supply against such leaks and prevent the schedule disruptions they cause," it was stated. "Also, being flexible, the cells resist the effects of minor crashes, which often cause the integral compartments to split or buckle."

For the present, the new bladder-type cells will be custom-built for each airplane.

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Specifications for Scrap Rubber of the Rubber Reclaimers Association

The specifications for scrap rubber established by the Rubber Reclaimers Association, Inc., have been revised as of June 1, 1944. Because these specifications are of direct importance to the entire rubber industry and because for the first time they clarify the previous confusion concerning synthetic rubber scrap we are publishing the new specifications in full herewith.—EDITOR.

GENERAL SPECIFICATIONS

The following general specifications apply to all grades of scrap rubber.

1. Origin of Scrap. Unless otherwise specified on the purchase order, all material sold to conform to these specifications shall be of United States or Canadian manufacture, or its equivalent.

2. Net Weight. All grades of scrap rubber, except foreign scrap as hereinafter noted, shall be paid for on the basis of the net weight determined at the Buyer's plant. Bags, coverings or containers shall not be included in the net weight nor shall the Buyer be under obligation to return them to the Seller.

3. Ton Weight. Unless otherwise specified on the purchase order, a ton shall be 2,000 pounds.

4. Foreign Scrap. In the case of purchase of scrap rubber of foreign manufacture, delivery shall be made c.i.f. Port of Entry of weight shown by a sworn weigher's certificate secured by and at the expense of the Seller. A copy of such certificate shall be supplied to the Buyer. Unless otherwise specified on the purchase order, such foreign shipments shall be subject to the same conditions as domestic shipments.

5. Bales. Passenger Tires and Truck Tires, Grades (a), (b), (c), Solid Tires and Air Brake Hose may be shipped bundled or loose in cars. All other grades shall be packed in bags or bales. Each bale shall weigh not less than 500 pounds, nor more than 1,500 pounds, and shall be well and securely bound with galvanized wire, when available. Bales which fall apart during shipment or unloading shall be considered as having been shipped loose. Material shipped contrary to these provisions constitutes an improper delivery and is subject to the provisions of Paragraph 12.

6. Separation of Grades. Each grade of scrap rubber shall be packed separately and other material present shall be subject to rejection as provided in Paragraph 12.

7. Moisture and Foreign Material. All scrap rubber shall be free from foreign material including mud, stones and cinders. When a shipment is received wet, the Buyer shall have the option of one of the two following procedures:

(a) He may estimate the amount of moisture and arrange for an allowance by mutual agreement with the shipper.

(b) He may select a representative sample of a shipment amounting to a minimum of either 500 pounds or 5% of the shipment and determine moisture content. This determination shall be made by drying the sample and determining the per cent shrinkage from wet to dry weight, which per cent shall be considered representative of the shipment. Two and one-half per cent shall be considered normal and allowable moisture content, and the invoice shall be adjusted accordingly.

8. Synthetic Rubber. Scrap containing synthetic rubber shall be delivered only subject to specific agreement between the Buyer and the Seller, except as indicated in (b)

(a) Tires and tubes manufactured with a synthetic rubber content which are improperly included in a delivery are subject to rejection in the same manner and with the same penalties that apply to other rejectable scrap.

(b) Tires manufactured of natural rubber but retreaded with synthetic rubber other than Thiokol shall be accepted as good delivery, provided that such retreaded tires do not constitute more than 25 per cent of any single shipment.

(c) The detection of any synthetic scrap in a delivery of tire parts against an order that does not specifically provide for synthetic scrap makes the entire shipment rejectable and returnable at the option of the buyer. Settlement shall not involve sorting on the part of the buyer or acceptance at a lower price, except as the buyer may freely agree.

(d) When a purchase order for any standard grade of scrap not covered by the above provisions does not specifically provide for the inclusion of synthetic scrap, it is understood that the dealer guarantees that deliveries will not contain synthetic scrap. The discovery of any percentage of synthetic scrap under those conditions will make the entire shipment rejectable at the option of the buyer without sorting or settlement by adjustment of price.

9. Embargo. If the Seller shall serve notice on the Buyer that an embargo prevents delivery of material within the time specified in the purchase contract, the Buyer shall grant an extension equivalent to the period of the embargo without otherwise changing the terms of the contract.

10. Failure to Deliver. If the Seller does not deliver in accordance with this contract, the Buyer may purchase a corresponding amount of scrap and charge the Seller for any loss incurred by such purchase.

11. Claims. All rejections or claims arising from the weight, quality, or condition of shipment shall be reported to the Seller promptly. Such claims when due to weight shall be reported within ten days and when due to other causes shall be reported within thirty days of the arrival of the material at the Buyer's plant.

12. Rejections. Any shipment of material which constitutes an improper delivery, because it is improperly packed, or includes material not covered by the purchase, or because it is not a good delivery of the grade of scrap bought, shall be subject to the following provisions:

(a) Such shipment shall be subject to acceptance or rejection in whole or in part at the option of the Buyer.

(b) If a shipment is rejected in whole or in part the Seller shall have thirty days within which to give instructions for the material to be shipped f.o.b. Buyer's plant. If shipping instructions are not given within thirty days, the Buyer may dispose of the rejected material. The Seller shall make replace-

ment at the Buyer's plant within thirty days of the date of notice of such rejection. In the case of a rejection of a full car not yet unloaded the Seller shall give disposition immediately and all demurrage shall be charged to the Seller.

(c) The total cost of handling and storing rejected material shall constitute a charge against the Seller whether or not any part of the shipment is retained by the Buyer. In the case of grades packed in bags or bales which must be opened and sorted, the charge for sorting shall be one-fourth cent per pound of the entire weight sorted.

STANDARD GRADES

The following constitute the standard grades of scrap rubber. Specifications for any group apply to all the divisions of that group.

1. Passenger Tires. Shall consist of whole pneumatic tire casings having six plies or less, and shall be free from hard, oxidized, burnt, filled, non-pneumatic, single tube and motorcycle tires, and from leather and metal.

(a) *Mixed Passenger Tires.* This grade shall consist of black whole tires free from stripped tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of roadworn tires.

(b) *Roadworn Passenger Tires.* This grade shall consist of Mixed Passenger Tires from which a substantial part of the tread has been worn through so that the fabric shows for a distance of at least one-half the circumference of the tire.

(c) *Beadless Passenger Tires.* This grade shall consist of Mixed Passenger Tires from which the beads have been cut but which conform otherwise to the specifications for Mixed Passenger Tires.

(d) *No. 1 Passenger Peelings.* This grade shall consist of treads stripped from black pneumatic passenger tires. The material shall be free from fabric, metal, leather, and hard, burnt, or oxidized treads.

No. 1A Passenger Peelings shall be free from cushion rubber.

No. 1B Passenger Peelings may contain cushion rubber.

(e) *No. 2 Passenger Peelings.* This grade shall consist of treads stripped from black pneumatic passenger tires. The material may contain cushion rubber, breaker fabric and sidewalls plus no more than one full ply of carcass fabric.

(f) *No. 3 Passenger Peelings. (Bald Head Peelings).* This grade is the same as No. 2 Passenger Peelings except that a part of the tread has been removed.

(g) *Passenger Dykes.* This grade shall consist of Beadless Passenger Tires from which two or more layers of fabric have been removed.

(h) *Passenger Carcass.* This grade shall consist of pieces of pneumatic passenger tires containing no tread, sidewall, bead, or cushion rubber.

(i) *Passenger S.A.G.* This grade shall consist of pieces of pneumatic passenger tires from which the treads and beads have been removed and may or may not contain sidewall rubber.

2. Truck Tires. Shall consist of whole pneumatic tire casings for busses and trucks having seven plies or more, and shall be free from hard, oxidized, burnt, filled, non-pneumatic single tube tires, and from leather and metal.

(a) *Mixed Truck Tires.* This grade shall consist of black whole tires free from stripped tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of Roadworn Tires.

(b) *Roadworn Truck Tires.* This grade shall consist of Mixed Truck Tires from which a substantial part of the tread has been worn through so that the fabric shows for a distance of at last one-half the circumference of the tire.

(c) *Beadless Truck Tires.* This grade shall consist of Mixed Tires from which the beads have been cut but which conform otherwise to the specifications for Mixed Truck Tires.

(d) *No. 1 Truck Peelings.* This grade shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, but shall be free from fabric, metal, leather, and hard, burnt, or oxidized treads. This grade may contain not more than 10% of No. 1 Passenger Peelings.

No. 1A Truck Peelings. This grade shall have the same specifications as above except these peelings shall be free from cushion rubber.

(e) *No. 2 Truck Peelings.* This grade shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, breaker fabric and sidewalls, but no more than one full ply of carcass fabric.

(f) *No. 3 Truck Peelings (Bald Head Peelings).* This grade is the same as No. 2 Truck Peelings except that a part of the tread has been removed.

(g) *Truck Dykes.* This grade shall consist of Beadless Truck Tires from which two or more layers of fabric have been removed.

(h) *Truck Carcass.* This grade shall consist of pieces of pneumatic bus and truck tires containing no tread, sidewall, bead or cushion rubber.

(i) *No. 1 Truck S.A.G.* This grade shall consist of pieces of pneumatic bus and truck tires from which the tread and beads, but not the sidewalls, have been removed.

(j) *No. 2 Truck S.A.G.* This grade shall consist of a mixture of No. 1 Passenger S.A.G. with No. 1 Truck S.A.G. and may or may not contain sidewall rubber.

(k) *Light Colored Carcass.* (1) *No. 1 Light Colored Carcass.* This grade shall consist of all white zinc carcass free of black edges and any other colored rubber. (2) *No. 2 Light Colored Carcass.* This grade shall consist of light colors as white, pink, light gray, pure gum and light brown carcass, free of all black edges and dark colored rubber.

(l) *Gray Carcass.* This grade shall consist of gray, and colors too dark for delivery under No. 2 Light Colored Carcass, and shall be free of all black edges and black rubber.

3. Passenger Tubes. Shall consist of inner tubes for pneumatic passenger tires, free from truck, bus and puncture-proof tubes, crusty and oxidized tubes, and free from metal and punchings. Sections of tube less than 12 inches long are not good delivery. All passenger tubes, except grade (f) Mixed Passenger Tubes, shall be free from metal valves. All passenger tubes, except (f) Mixed Passenger Tubes, and (e), Black Passenger Tubes, shall be free from black rubber valve cots and the bases of such valves.

(a) *No. 1 Passenger Tubes.* This grade shall be strictly elastic, floating tubes free from black or colored tubes. (1) Transparent Floating Tubes are Transparent No. 1 Tubes. (2) Brown Floating Tubes are No. 1 tubes containing no white tubes.

(b) *No. 2 Passenger Tubes.* This grade shall consist of compounded passenger tubes free from black, red and two-toned passenger tubes.

(c) *Light Colored No. 2 Passenger Tubes.* This grade shall consist of No. 2 Passenger Tubes specially selected as to color by agreement between the Buyer and the Seller.

(d) *Red Passenger Tubes.* This grade shall be strictly RED tubes.

(e) *Black Passenger Tubes.* This grade shall be strictly black compounded passenger tubes. Black rubber valve cots and their bases may be present, but no metal valves or parts.

(f) *Mixed Passenger Tubes.* This grade shall consist of whole tubes of various colors and qualities and may contain valves unless otherwise specified in the purchase contract.

4. Truck Tubes. Shall consist of inner tubes for pneumatic truck and bus tires free from crusty, oxidized or puncture-proof tubes, metal and punchings. Sections of tube less than 12 inches long are not good delivery. All truck tubes, except (a), Mixed Truck Tubes, shall be free from metal valves and from black rubber valve cots and the bases of such valves unless otherwise specified in the purchase contract.

(a) *No. 2 Truck Tubes.* This grade shall consist of compounded truck tubes free from black, red and two-toned tubes.

(b) *Red Truck Tubes.* This grade shall be strictly RED tubes.

(c) *Black Truck Tubes.* This grade shall be strictly black compounded truck tubes. Black rubber valve cots and their bases may be present, but no metal valves and parts.

(d) *Mixed Truck Tubes.* This grade shall consist of whole tubes of various colors and qualities and may contain valves unless otherwise specified in the purchase contract.

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Editorials . . . . . .

World-Wide Collaboration

THE first step toward an eventual world-wide agreement of some kind on rubber has been taken. As previously reported, the British in particular have been urging the earliest possible formation of a new committee, international in composition, to replace the recently liquidated International Rubber Regulation Committee. The new committee, it has been proposed, would give greater recognition to the consumers of rubber, and would concern itself more with research to broaden the applications of rubber, and with statistics, than with rules and regulations covering production, supply and prices.

The step referred to is the formulation in this country by the State Department of a combined industry-government rubber advisory panel, the function of which is to serve as a consulting body on all matters pertaining to rubber, in all of its present forms, natural and synthetic. Heretofore, the State Department declined to commit itself on any specific program of collaboration where rubber was concerned, because of the complexity of the problems involved and the uncertain future of synthetic rubber. With the newly-created rubber advisory panel to turn to, it is probable that a definite policy will soon be agreed upon and announced.

The membership of the rubber advisory panel embraces some of the outstanding executives of the rubber industry—Litchfield, Davis, Collyer, Jackson, Hotchkiss, Smith and Viles. It includes several government executives who have been closely allied to the over-all rubber picture in the past few troublesome years—Batt of WPB, Klossner of Rubber Reserve, Tompkins of ORD, Bicknell of Rubber Development, and R. D. Young, formerly with Rubber Reserve and now president of the Rubber Trade Association of New York. Upon these men will rest decisions which will affect the future of the entire rubber industry—production and manufacturing—since the United States is not only the largest consumer of rubber, but is also producing synthetic rubber at a rate practically equivalent to the production of natural rubber in the prewar period.

Decisions of the advisory panel, and the term "advisory" must be emphasized, are made most complex because of two basic difficulties: (1) Uncertainty with respect to the condition of rubber plantations presently held by Japan; (2) Uncertainty with respect to the further development of synthetic rubber in the United States. Irrespective of these difficulties, we feel certain that world-wide collaboration is plausible, especially if the problem is attacked not from the viewpoint of crude versus synthetic rubber, but rather with a view toward blending of the two materials in a world market under a program which would prevent sharp fluctuations in price and sudden shortages in times of emergency.

New Products

A STUDY of postwar preparation activities by industries, covering 350 major companies, including nine in the tire and rubber industry, was recently completed by the Research Department of the Curtis Publishing Co., publishers of the *Saturday Evening Post*. The study showed that 58% of all the companies interviewed are planning to bring out some kind of new product, with the tire and rubber and paper and paper products groups having the highest percentage of companies reporting such plans. Based on the survey, it is estimated that new products are planned by 89% in the tire and rubber industry, many of them plastic in nature. Although the percentage is too high if applied to the whole rubber manufacturing industry, it is nevertheless indicative of the trend. If the smaller rubber manufacturer wants to avoid being left at the post, he had better start doing some postwar planning of his own.

CURRENT NEWS OF THE MONTH

MANPOWER TO OPERATE PRESENT FACILITIES IS CRITICAL PROBLEM OF ENTIRE INDUSTRY

AS indicated last month, synthetic rubber production facilities are proceeding satisfactorily, production of synthetic rubber is rapidly reaching the planned monthly output, most of the raw material plants are exceeding rated capacities, the rubber manufacturing industry has apparently found its level, and major regulations and restrictions have been absorbed by the industry, the minor ones still being issued being easily taken in stride. Two big problems still face the industry: increased manufacturing facilities for the production of rubber goods, especially tires, and the manpower to operate both present and planned facilities. The latter situation is in the critical state.

On June 1, Paul V. McNutt, Chairman of the War Manpower Commission, issued a statement to the effect that unless means are found to recruit additional manpower for the manufacture of heavy duty tires, tire cord and tire fabric, the armed forces, particularly the Army, will suffer. He pointed out that during the period when few tires were being manufactured because of the lack of natural rubber, tire workers, skilled and unskilled, left the industry for other war industries, or joined the armed forces.

"Now that synthetic rubber is being produced at a rate of better than 70,000 tons a month, a critical problem today is to find the manpower to man existing and new facilities to fabricate the product into end products, especially heavy duty tires on which the Army trucks and other fighting equipment roll," said Mr. McNutt.

"Heavy duty tires determine how hard our armies in the field can strike and we are not making them in the required quantities. The reason is that the plants producing tires do not have the manpower. We must find it because the demand of the armed forces for tires for use on trucks, artillery, airplanes and for other military equipment is so urgent that it cannot be neglected. The demand must be filled."

Careful Survey Made

Mr. McNutt said a WMC survey showed that although the additional manpower needed by manufacturers of heavy duty tires for military needs does not involve extremely large numbers of workers, the plants are at present unable to fill vacant jobs even though the wages paid are fairly good. The work calls for strong, husky men in areas in which no labor surplus exists. An immediate need exists for 2000 men—700 of them exceptionally strong men, as tire builders and mill men, calender operators and in other occupations.

The survey showed that heavy duty tire manufacturers need about 200 women immediately. To meet production requirements by September 30, heavy duty tire makers will require a total of 5000 men and 1000 women. The tire industry as a whole will require approximately 10,000 additional workers.

"Of course, there are factors other than the manpower shortage involved in the tire production problem, but through the cooperation of other agencies most of these are being solved," said Mr. McNutt. "However, the present labor shortage in the heavy duty tire industry should not be minimized." Critical labor shortages also exist in 28 tire cord and tire fabric plants. In order to reach peak employment, these tire cord and tire fabric plants will need about 4,000 additional workers.

Serious labor shortages also exist in plants making rubber soles and heels used by the armed forces and by civilians as a leather substitute. Production requirements for rubber soles and heels are up 50 per cent over the requirements of a year ago. About 3100 workers are needed to fill these production requirements, according to Mr. McNutt.

WPB Coordinating Program

A new move to increase tire production through better cooperation of management and labor unions was launched by the War Production Board last month. A series of meetings was held with U.R.W.A. officials in the Akron area and the numerous charges and countercharges made in recent weeks were carefully sifted and discussed. The upshot of these conferences is expected to result in better labor-management relations with a resultant increase in tire production.

These charges and countercharges, several of them made by David Lawrence, well-known Washington columnist, included the claim that agreed-upon limits of production by union officials was hindering the output of tires. It was also charged that absenteeism was running very high in the tire plants and was one of the chief causes of loss of tire production.

In refuting these charges, union officials claimed that tire builders were producing far beyond the standards set up by the rubber companies and that the average absenteeism rate for tire building departments was far below that for other departments of the tire plants, especially those departments where housewives and youngsters in their teens are working. The delay in getting synthetic rubber for civilian tire production was also said to have seriously affected this type of production.

Rush Tire Cord Facilities

In the meantime, despite labor shortages, facilities for producing rayon tire cord and fabric, critically needed for the manufacture of heavy-duty tires, are being rushed to completion as fast as possible.

The rayon tire cord plant being erected at Clemson, near Greenville, S. C., ground for which was broken last February, is nearing completion and will probably go into production in the next few weeks. The plant is being erected by Deering, Milliken & Co., of New York, and will be operated as the Clemson Plant of Excelsior Mills. It will be the first rayon tire cord plant to be erected in South Carolina and will be the largest independent producer in the United States. The mill will be more than 600 feet long and will be equipped with completely modern machinery.

It is also reported that with one new addition completed at the Decatur, Alabama, mill of the Goodyear Tire & Rubber Co., construction has been started on still another addition. The second addition, like the first, will be devoted to production of rayon fabric for tires and other rubber products.

The two new additions add about 250,000 square feet of floor space to the original Decatur Mill, bringing total floor space utilized to 402,888 square feet. Although the first addition was financed by Goodyear as part of its $30,000,000 improvement program, the second is being financed by the Defense Plants Corp. The Decatur Mill was put into operation by Goodyear in November, 1933. The company also operates a fabric mill at Cedartown, Georgia.

On May 22, WPB announced that companies engaged in the manufacture of high tenacity tire type rayon yarn; cotton, rayon and nylon tire cord, and tire fabrics may use an AA-1 preference

rating to obtain maintenance, repair or operating supplies (MRO) for the conduct of such business. Previously, such companies were allowed to use the lower AA-5 rating for this purpose. The action was taken by including this type of production in List 1 of C.M.P.R. No. 5, as amended May 18, 1944.

Lift Balata Controls

Coquirana and chicken-wire balata have been exempted from allocation control by WPB and may now be used by manufacturers for any purpose. This exemption was accomplished with the issuance of Amendment No. 3 to Rubber Order R-1, as Amended January 12, 1944, and became effective May 29. The exempted types are used largely in shoe cements and paper-splicing cements.

Two other types of balata—massarunduba and Peruvian F.A.Q. white—were removed from restrictions in March of last year. All types of scrap and reclaimed balata have always been exempted from any restrictions.

STANDARD OIL ORDERED TO SURRENDER STOCK OF CERTAIN COMPANIES

An order demanding the surrender by the Standard Oil Co. (N. J.) of 20% of the outstanding stock of the Standard Catalytic Co., 50% of the outstanding stock of Jasco, Inc., and 25% of the stock of the Hydrocarbon Synthesis Corp., was issued by the Alien Property Custodian on May 24.

The securities involved were formerly the property of I.G. Farbenindustrie, A.G., and the three American corporations were organized to operate in the United States certain patent pooling arrangements sponsored jointly by that company and Standard Oil. The order applied also to approximately 675 patents and about 100 applications for patents. Many patents covering the production of synthetic rubber were held by Jasco, Inc.

The interest of I. G. Farben in both the patents and the shares was vested in the Alien Property Custodian by Vesting Order No. 1, March 25, 1942. The pooling arrangements were declared illegal in the consent decree entered March 25, 1942, in the Government's antitrust suit against Standard Oil. The decree reserved the rights of the Alien Property Custodian in the stock and in the patents originally placed in the pool by I. G. Farben.

The ownership of the stock and these patents has been the subject of a series of conferences, now concluded, between the Custodian and officials of the Standard Oil Company. After giving full consideration to the claims of the Standard Oil Company that it was the owner of the patents and shares of stock, the Custodian has concluded that his vesting of the interest of I. G. Farben in the patents and shares took full and complete title because I. G. Farben owned them at the time of the vesting.

The antitrust decree set up a comprehensive system for compulsory licensing of these patents under the supervision of the Department of Justice irrespective of the ultimate solution of the disputed claims of ownership of the patents. Special agreements for the use of the patents in the production of synthetic rubber and in catalytic refining are in force, as the result of an understanding between the Custodian and the Standard Oil Company that the disputed ownership should not affect in any way the widest possible use of the processes covered by the patents in the war production program.

Argentina Plan Stymied

The apparent plans of the Argentine Government to start a synthetic rubber industry in Argentina to relieve the critical rubber shortage in that country with the assistance of engineering help from this country was indirectly but firmly nipped in the bud by the State Department late last month.

An advertisement inserted in the *Washington Post,* signed by the Ministry of Agriculture of the Argentine Republic, invited bids prior to August 21 for installation in Argentina of "a manufacturing plant for Buna-S or Buna-N synthetic rubber, or similar products, and its basic hydrocarbons, of the type best suited to manufacture and retread tire casings and tubes for automobile vehicles."

Publication of this advertisement brought forth the immediate comment from Under-Secretary of State Edward R. Stettinius, Jr., that American rubber production was part of our essential war program and that it would be impossible for us to agree to export equipment, patents or know-how to the Argentine Government at this time. This attitude obviously would make impossible the fulfillment of any contract by any American company or individual.

The Argentine Embassy subsequently expressed surprise at this statement, declaring that since much time would be consumed in organizing the project, the question of exports would not come up for some time to come. The advertisement was described as "an international bid" opened simultaneously throughout the non-Axis world.

Dedicate Lake Charles Plant

One of the world's largest integrated aviation gasoline, butadiene and synthetic rubber plants was formally dedicated at Lake Charles, Louisiana, by the Cities Service Oil Co. and the Firestone Tire & Rubber Co. on May 26. Cities Service operates the refinery and butadiene plants, the latter feeding the copolymer plant operated by Firestone.

The butadiene plant, according to W. Alton Jones, president of Cities Service, who presided over the dedication ceremonies, is considered the most up-to-date of its kind and is the lowest-cost butadiene plant in the world. The copolymer plant has a rated capacity of 60,000 tons a year.

Among the speakers at the dedication was Harvey S. Firestone, Jr., president of the Firestone company, who declared that the world would need "every pound of rubber, both natural and synthetic, that can be produced during the first few years after the war," and Ralph K. Davies, Deputy Petroleum Administrator.

Expand Neoprene Facilities

According to an announcement by DuPont on May 25, construction has begun on additions which will increase the neoprene plant capacity at Louisville, Ky., by 50%. This plant, built and operated for the government by DuPont, has been producing in excess of its rated capacity of 40,000 tons per year, and the new expansion will bring rated capacity up to 60,000 tons. Work on the new construction is expected to be completed by the end of 1944.

Construction of the new unit, the fifth at the plant, will cost an estimated $7,000,000. The unit was planned over a year ago and had priority approval. The project, however, was cancelled without warning by WPB late last summer. It is understood that the unit now being constructed will be built at less cost than previously planned.

It has also been learned that a small-scale model synthetic rubber plant will be built at Louisville by the National Synthetic Rubber Corporation, which operates a GR-S plant for the government. The new plant will be used largely as a research laboratory and will be used to conduct and check experiments which are costly in time when carried on in the main plant.

Opposes Cuts in Alcohol

Present industrial alcohol requirement for the synthetic rubber program must stand without change unless there is a shift in the production schedule for 100-octane aviation gasoline, Rubber Director Dewey insisted at a hearing before the Senate sub-committee investigating the liquor situation in Washington on May 19.

If 100-octane demands on petroleum plants are increased, the synthetic rubber program might require even more industrial alcohol than the 365,000,000 gallons which have been listed as the minimum requirement for 1944 and 1945, Colonel Dewey said.

OPA PROVIDES PLAN FOR ADJUSTING CEILING PRICES ON ESSENTIAL GOODS

Under the terms of Amendment No. 15 to M.P.R. 220 (Certain Rubber Commodities), issued by OPA on June 10, applications for adjustment in ceiling prices may now be filed by essential manufacturers of a variety of rubber commodities who can meet specified conditions. In no case, it was pointed out, will adjustments be granted that tend to increase the cost of living. The amendment is effective June 30.

Applications can be made only on products contributing to the effective prosecution of the war, and by essential manufacturers. An essential manufacturer is one whose product cannot be reasonably expected to be replaced at prices lower than the proposed maximum price. Any manufacturer who has entered into or proposes to enter into a war contract is deemed an essential producer of these rubber commodities.

Manufacturers may file adjustment applications where they believe the specified conditions would exist if the National War Labor Board should grant a pending application for wage increases.

OPA said it may make an adjustment in the ceiling price where it finds that the existing ceiling is such that taking into account the costs, earnings and nature of the business, production is impeded or threatened, and that the adjustment will not cause an increase in the cost of living.

An adjustment may be granted where the manufacturer agrees to make a reduction in the selling price of another commodity, or commodities, which will equal or exceed the total dollar amount of the adjustment requested.

Manufacturers may contract or agree on higher than existing ceiling prices for deliveries made during the pendency of an application for adjustment, but no payment higher than prevailing ceilings may be received until the application is finally disposed of, and then the price received must not be higher than the new ceiling set by OPA.

COATED FABRICS

Four changes in the regulation establishing manufacturers' ceilings for coated and combined fabrics—M.P.R. 478—were effected by the issuance of Amendment No. 3 to that regulation. The amendment, issued by OPA on May 19, became effective May 24. The changes provide simplified methods of determining ceiling prices in line with general industry practice. The general price level is not changed by use of the new methods nor are retail prices affected. The four specific changes follow:

1. To determine ceiling prices for coating and combining services performed on cloths owned by others, manufacturers will select a fabric sold by them during the base period on which they performed the same services. The base period for civilian goods is March 1942, while for military goods it is either April 1942 or under special circumstances May 1, 1942, to April 30, 1943. From the maximum price of the fabric sold during the base period, manufacturers then deduct the sum of (1) the base period cost of the cloth, and (2) the working allowance on the contract. The resulting ceiling must be reported to OPA within ten days. Sales may be made at the new price meanwhile. If OPA does not advise otherwise within 15 days, the reported ceiling may be taken as approved. Previously, on these operations, manufacturers had to apply to OPA for a specific ceiling price.

2. For fabrics different from those dealt in during the base period, manufacturers may apply the regulation's formula, no matter how much factory costs exceed those of base period fabrics. Heretofore the formula could only be used when factory costs for the new product did not exceed those for base period fabrics by more than 25 per cent. For the others application had to be made for a specific ceiling price.

3. Where a manufacturer is required to redetermine his maximum price after 2 months' production, he may do so simply by substituting his actual labor hours and quantity of materials for the estimates used in his original computation of the maximum price. He need not go through the process of selecting another comparable item.

4. Where odd lots of cloths are substituted in the manufacture of finished coated or combined fabrics, manufacturers will determine ceiling prices by adjusting the ceiling for a standard grade of the fabric by the difference in the base period cost of the cloth.

HEELS AND SOLES

Retail ceiling prices ranging from 15 to 30 cents a pair for higher quality rubber heels sold in the home replacement trade were established in Amendment No. 4 to M.P.R. 477 (Sales of Rubber Heels and Soles in the Shoe Factory and Home Replacement Trades), issued by OPA on May 17 and effective May 24. For the same higher quality rubber heels, manufacturers were given ceilings ranging from 90 cents to $1.65 per dozen pairs, and wholesalers' ceilings were established at from $1.20 to $2.20 per dozen pairs.

Heretofore, retailers had ceiling prices ranging from 10 to 15 cents a pair, which became effective January 7, 1944. At that time the indications were that only lower quality special competitive grade heels, such as normally sold in this trade, would be on the market. The industry, however, is now making available rubber heels of higher quality than formerly, and an adjustable pricing authority was granted recently, now succeeded by the new regulation.

Later, on June 7, OPA issued Amendment No. 5 to this same regulation, increasing ceiling prices on sales to shoe factories of black type composition rubber soling slabs and molded soles approximately 10%. This increase was granted to help assure production of vitally needed rubber soles. The increase, however, cannot be passed on to the consumer in the form of higher prices for shoes unless special authority to do so is granted.

Before the war, black molded soles and soling slabs constituted less than 10% of the production of the heel and sole industry. Because such products require less rubber, labor and factory time, only black rubber soles have been produced since early in the war. The industry has been asked by ORD to double its 1943 output in 1944 and to more than double the 1943 output in 1945. The OPA action is expected to facilitate reaching these objectives. The new ceilings range from 78 cents to $2.37 per slab for the composition soling slabs, and from 10 to 24½ cents a pair for full soles.

It is understood that consideration is being given in Washington to the lifting of color restrictions for rubber-soled shoes and styling restrictions on rubber and vinyl plastic soled shoes. As a result of the government's release of certain amounts of scrap rubber, a freer supply of vinyl plastic scrap, and increased production facilities of rubber sole manufacturers, both rubber and plastic soles are expected to be in freer supply by the end of this year.

BOOTS AND SHOES

To simplify their inventory records, retailers and distributors of men's rubber boots and rubber work shoes will be given statements covering ration certificates exchanged or issued to them by OPA district offices, it was announced on May 20. This simplification is covered in Amendment No. 10 to RO 6A (Men's Rubber Boots and Rubber Work Shoes), effective May 23. The same amendment permits half-pairs of ration rubber footwear to be used as samples, provided that the dealer furnishing the footwear keeps title to it.

An additional simplification of this ration order was accomplished on June 9 with the issuance of Amendment No. 11, which removes certificate expiration dates for both consumer and trade use. Ration certificates for the purchase of boots and work shoes will now be good indefinitely. Formerly, consumers had to use these certificates within 30 days of issue and dealers within one year. In view of the fact

that expiration dates have been eliminated, rubber footwear manufacturers need no longer endorse certificates with the date of receipt.

MISCELLANEOUS ORDERS

Among miscellaneous government regulations issued in recent weeks of interest to the rubber industry were the following:

Several changes in ceiling prices covering new bicycle tires and tubes were made in Amendment No. 4 to M.P.R. 435, issued June 1 and effective June 6.

Provisions controlling the use of rubber tires in the manufacture of tank car heaters, pumping boosters or circulators, and bituminous sprayers have been removed from the schedules of the simplification and conservation order (Schedules IX and XIII of Order L-217) covering these items.

War Food Order No. 35 has been amended to permit the use of rapeseed oil without authorization in several products, including factice for insulation and the compounding of rubber. Satisfactory inventory of the oil led to the decision to eliminate the filing of applications for authority to use.

CHANGE REGULATIONS COVERING TIRES SUBJECT TO ALLOCATION

New regulations governing various types of tires subject to allocation control, and new procedures for allocating such tires to vehicle manufacturers, were announced by OPA on May 31. The regulations, which are in the form of a revised version of Appendix IV of Rubber Order R-1, apply only to tires for special vehicles, such as tractors and road-graders, not to civilian passenger car tires, which are not subject to allocation control.

The major change included in the regulations is a provision that cured-on solid tires are no longer subject to allocation, but instead may be procured by vehicle manufacturers through the regular certification-procedure provided in the Rubber order for tires not under allocation. The other new provisions are procedural in nature. For purposes of greater clarity and exactness, a more precise definition of each type of tire subject to allocation-control has now been included in the latest order.

The procedures whereby authorized vehicle manufacturers may obtain tires have been revised to provide for the use of a new general application form (WPB-3663.) This form is to be filled out by each manufacturer, stating his requirements, and then forwarded to the appropriate industry division in WPB. Another new form (GA-1773) has been specified for use of the industry division in authorizing the vehicle manufacturer to obtain necessary tires for the equipment he produces. Previously, these steps were handled as unformalized statements from the manufacturers and, in turn, by letters of authority from the WPB.

Provision is now made for the industry divisions to handle the issuance of authorizations for increases or decreases in a vehicle manufacturer's requests for tires. The purpose of this provision is to allow the various industry divisions more flexibility in making adjustments in accordance with changes in vehicle production programs. Previously, the Office of the Rubber Director has handled such increases or decreases in response to direct appeals.

A certification form has been added to the order for the use of government agencies which purchase tires—for example, the Foreign Economic Administration and the Army. This new form will be used by the claimant agencies when purchasing tires for replacement purposes, and will enable claimants to formalize their procurement procedures to make proper charges against allotments.

In the order, a list is given of all vehicle and equipment programs for which the War Production Board may allocate tires to a vehicle manufacturer. This list has now been greatly expanded, to give detailed breakdowns of all types of non-military vehicles for which allotments of tires may be required by manufacturers. For easy reference, the new list also shows which industry division in WPB controls each type of vehicle and equipment, so that a vehicle manufacturer will know exactly which division should handle his request for tire-allotments.

Changes in M.P.R. 415

Three changes in the regulation establishing ceilings on purchases of new rubber tires and tubes by the government were announced by OPA on May 27. These changes, in the form of Amendment No. 6 to M.P.R. 415 (Certain Federal Government Purchases of New Rubber Tires and Tubes), all effective May 29, follow herewith:

1. Ceilings for sizes and types of natural rubber tires and tubes not specifically provided with dollar-and-cent ceilings in the regulation will be established in line with the ceilings for listed sizes and types upon specific application to OPA. Ceilings proposed by the seller in the application will be considered approved unless OPA disapproves them within 20 days from date of application.

2. Sales to the Army and Navy of any new rubber tires and tubes except those for aircraft are brought under this regulation for the first time. Ceilings will be the same as those applying to sales to Foreign Economic Administration and the Maritime Commission. These ceilings are 5 per cent less than the list dollar-and-cent ceilings, but are f.o.b. instead of delivered prices.

3. A specific provision is inserted so that a seller who believes that a maximum price established by this regulation impedes or threatens production may file an application for adjustment of his ceiling price.

Tire Quotas for June

In announcing tire quotas for the month of June on May 31, OPA emphasized the fact that demand for new passenger tires still far exceeds production or the available quota and that a critical situation exists in the case of heavy-duty truck tires, with early quota exhaustion and some idle trucks inevitable.

The specific June allocations include: 1,600,000 new passenger and motorcycle tires, an increase of 200,000 over May; 360,000 new truck tires of size 7.50 or smaller, up 35,082 from May; 125,000 new truck tires of size 8.25 or larger, 4,700 less than May; 20,000 new rear tractor and large implement tires, down 5,000 from May; and 55,000 new front tractor and small implement tires, an increase of 3,000.

Rationing quotas for tubes of all types have been discontinued. Tubes continue to be rationed, but without restriction as to the number of certificates that local rationing boards may issue to eligible applicants, the supply of tubes being sufficient to meet all reasonable demands.

In connection with the June allocations, Rubber Director Dewey issued a statement emphasizing that it will not be possible to manufacture enough passenger car tires to provide replacements for non-essential drivers or those who fail to take proper care of tires. Recommending that motorists take extra special precautions to conserve their tires, the Rubber Director listed the three following factors as the primary causes contributing to the tire shortage for civilians:

1. Military demands for tires and other rubber products continue enormous. At the same time, more than half of today's over-all requirements, both commercial and military, are for large size, heavy-duty bus, truck, airplane and combat vehicle tires, which require much more labor than small size tires.

2. The demands of the armed services for self-sealing gas tanks, life rafts, amphibious landing craft, and innumerable other rubber products other than tires continue to require a large percentage of our manufacturing facilities.

3. Tire and tire cord manufacturers are handicapped by the manpower shortage, making it impossible, along

with other factors, to meet normal civilian requirements, much less the backlog of demand that has accumulated over the past two years.

Amendment to Ration Order

During the six-week period from June 1 through July 15, manufacturers may ship new passenger car tires and tubes to dealers without obtaining tire rationing certificate replenishment portions, under the terms of Amendment No. 77 to Ration Order 1A (Tires and Tubes). The move in no way changes the present method through which a motorist obtains a tire or tube certificate from his local rationing board, but will facilitate the shipment of new passenger tires from manufacturers to dealers, thus bringing about better distribution and services to the consumer.

Several other changes in the rationing regulations are covered in the latest amendment, including the elimination of any distinction between retail and wholesale tire dealers. Also, under the amendment, tire dealers who closed their establishments several years ago because of limited tire distribution may now re-enter business and obtain new passenger tires and tubes on a basis similar to the allotment provided for existing dealers.

Synthetic Motorcycle Tires

Under the terms of Order No. 4 to M.P.R. 528 (Tires and Tubes, Recapping and Repairing), issued May 26 and effective May 27, the maximum retail price for a 3.85 x 20, 4-ply, synthetic rubber motorcycle tire is set at $11.30, and the maximum retail price for a 3.85 x 30 synthetic rubber motorcycle tube is set at $2.20.

Offer Aid on Export Seals

Manufacturers of other nations have long enjoyed government-sponsored identification programs in foreign markets. Now, for the first time in our export history, a concerted official effort is underway to provide the same service to United States exporters. A new red, white and blue official export seal has been approved and millions of non-lend-lease articles now exported to foreign nations can be uniformly identified as "imported from the United States." The seal can be used in any shape or size, according to the Office of War Information. While O.W.I. does not supply the seals, it does supply translations in any language and the basic design. To facilitate the program, the Meyercord Company, of Chicago, decalcomania manufacturers, is offering to prepare special decalcomania sketches of manufacturer's nameplates combined with the export seal. Full information regarding the export seal program may be secured from the Special Promotion Division, Office of War Information, 250 West 57th St., New York 19, N. Y.

To Furlough Rubber Workers

According to reports in Washington circles, the War Department is preparing to furlough several thousand soldiers who are experienced rubber workers to relieve the critical manpower shortage in the tire industry. The bulk of these workers are expected to be chosen from men 34 and older who are stationed within the Continental United States. It is estimated that 12,000 workers are needed for the tire industry to produce its planned output this year.

ONTARIO GROUP IS SPONSOR OF 1944 CONFERENCE SESSION

The Ontario Rubber Section of the Canadian Chemical Association acted as sponsor of a special rubber session during the 1944 Canadian Chemical Conference and Exhibition held at the Royal York Hotel in Toronto on June 5, 6 and 7. The rubber session was held on the morning of June 6, with John Ramsay (Gutta Percha & Rubber, Ltd.) as chairman. The Conference, the 27th to be held, was under the auspices of the Canadian Chemical Association, the Canadian Institute of Chemistry, and the Canadian Section of the Society of Chemical Industry. The attendance was reported as excellent.

The rubber session featured four interesting papers, all of which were received with enthusiasm. The first paper was on "125,000 Miles as Tire Consultant for the Allied Air Forces," by E. A. Roberts of the Firestone Tire & Rubber Co. Mr. Roberts, who is in charge of airplane tire development for Firestone, and who has been on loan to both WPB and the Army Air Corps as a tire consultant, discussed airplane tire engineering problems encountered in the United States, Alaska, England and India. He showed numerous slides to illustrate specific points made, including types of tire failures encountered with various aircraft under severe service conditions.

Next, J. D. Morron, manager of the motor products development division of the U. S. Rubber Co., and an advisor to WPB on mountings, shock absorbers and dampeners, discussed "The Properties of Synthetic Rubber and Their Effect on Vibration Characteristics," with special emphasis on the effect of temperature on both natural and synthetic rubbers, particularly where sub-normal temperatures were involved. The speaker described a number of pieces of specially built equipment, including one for measuring the transmission of vibration at various temperatures.

The third speaker was Dr. B. S. Garvey, of the B. F. Goodrich Co., who took as his subject "Softeners in Synthetic Rubbers." Dr. Garvey discussed the function of softeners in the compounding of natural and synthetic rubbers and indicated how the chemical and physical properties of various materials are related to their use as softening agents for rubber. The organization, interpretation and use of compounding studies was explained, using Hycar and GR-S as examples.

H. A. Endres, assistant director of research of the Goodyear Tire & Rubber Co., was the final speaker at the session. Discussing "Derivatives of Synthetic Rubbers," Mr. Endres pointed out that such derivatives have been the subject of considerable research to obtain materials similar to those made from natural rubber by cyclization, chlorination and hydro-chlorination. Synthetic rubber derivatives made to date, he said, indicate that many of the properties of natural rubber derivatives may be duplicated in the synthetic field. It may also be possible, he intimated, to incorporate desirable characteristics in the synthetic derivatives not possible of attainment in those made of natural rubber.

Polymerization Is Topic

In addition to the papers described above, one on "Polymerization" was given by Dr. G. S. Whitby, of the University of Akron, at the General Session of the Society of Chemical Industry, held on the afternoon of June 6. In his talk, Dr. Whitby stated that in order to obtain strength in materials it is necessary to produce very large molecules, and two general principles may be followed: (1) Addition polymerization, which depends upon the presence of a double bond in the molecule, Butyl rubber being an example; and (2) Condensation polymerization, in which water splits off and large molecules may be built, the synthesis of nylon being an example of this method. He predicted tremendous advances in the field of high polymers which, he said, had hardly been touched.

Of special importance at the Conference was the provisional establishment of a new organization, called the Chemical Institute of Canada, which will absorb the Canadian Chemical Association, the Canadian Institute of Chemistry, and the Canadian Section of the Society of Chemical Industry. The results of a plebiscite vote conducted by mail to the combined membership of the three organizations prior to the Conference indicated an overwhelming majority in favor of amalgamation into a single organization, now approved. More than 1600 Canadian chemists and chemical engineers were polled.

Change Name of Columbia Resins

The Columbia Chemical Division of the Pittsburgh Plate Glass Co., Barberton, Ohio, has announced the selection of the trade name "Allymer" for the complete line of allyl resin monomers formerly known as Columbia Resins and designated as C.R. 39, etc. The numbers will be continued to designate types.

SOFT VINYLS AND POLYESTERS DISCUSSED AT ASME MEETING

Papers on "The Softer Vinyl Plastics," by H. F. Robertson, of the Carbide & Carbon Chemicals Corp., New York City, and "The Rubber-Like Polyesters," by B. S. Biggs, of the Bell Telephone Laboratories, Murray Hill, N. J., were heard by members and guests of the Rubber & Plastics Division, Metropolitan Section, American Society of Mechanical Engineers, held on May 22, in the Engineering Societies Building in New York City. Dinner at the Midston House preceded the meeting, attended by approximately 65 people.

The meeting was arranged by Felix L. Yerzley, well-known rubber technologist, formerly associated with du Pont and now affiliated with the Western Electric Co. Mr. Yerzley has long been associated with the rubber activities of the A.S.M.E. C. A. Russ, of the U. S. Rubber Co., acted as chairman, and gave a brief introductory speech in which he made mention of the growing alliance between rubbers and plastics. Abstracts of the two papers follow:

Abstract of Vinyl Talk

The Softer Vinyl Plastics: During the past few years, due in part to the shortage of natural rubber but also to their unique and useful properties, the "softer" or elastomeric vinyl plastics have had a spectacular growth from the point of view of both the quantities produced and the number of their applications.

This discussion will not be concerned with plastics made from such vinyl compounds as butadiene, styrene, acrylic esters and other important monomers, but will be limited to those made from monomers which commonly use the word vinyl in their chemical names and which can be compounded to give soft or elastomeric materials. In general, such monomers are chemically the esters and acetals of the hypothetical monomer—vinyl alcohol.

Specifically, the resins that will be discussed are the high molecular weight vinyl-chloride-vinyl acetate copolymer of a high chloride content, polyvinyl chloride and polyvinyl butyral. These resins exceed all the other vinyl resins in the quantities produced and are used almost exclusively for the manufacture of the "softer" elastomeric vinyl plastics.

Vinyl chloride-vinyl acetate copolymers, polyvinyl chloride and polyvinyl butyral are thermoplastic linear polymers having considerable rigidity at ordinary temperatures. This rigidity is due to the reinforcing effect of secondary valence bonds or so-called Van de Waal's forces acting between the molecules. The effect is to tie the whole molecular structure together in much the same way that a bridge truss is stiffened. If, however, some substance is added to the resin which will, in itself, loosely add on to those points on the resin chain which tend to tie the resin molecules together, the forces between the molecules are reduced and the molecular structure becomes flexible in much the same way that a bridge truss would lose its rigidity if some rivets were removed.

A material which is added to decrease the rigidity of the vinyl resins is called a plasticizer. By developing plasticizers with proper solvating power for the resin the physical properties of the plastic such as low temperature flexibility, tensile strength, elongation, etc., can be varied to suit specific needs. In choosing a plasticizer thought also has to be given to such factors as anticipated loss of plasticizer through volatility or extraction. (Such properties as plasticizer loss as influenced by the type of plasticizer used, temperature and specimen thickness were illustrated by slides. Slides were also shown which indicated the relationship of stiffness of copolymer plastics to type and concentration of plasticizer.)

In addition to the influence of the plasticizer, other materials which are added to the original resin have considerable influence on the properties of the resulting plastic. For example, the addition of certain fillers has a beneficial effect on the shrinkage of elastomeric injection molding compounds while the percentage of plasticizer and molding temperatures also affect this property.

As the properties of the softer vinyl plastics vary considerably with composition, it is difficult to be specific regarding the physical properties of such materials. However, in general, the copolymer and polyvinyl chloride elastomers are highly resistant to oil, water and oxidation, being superior in this respect to natural rubber. Their tensile strength is greater than rubber compounds of equivalent hardness while they are more abrasion resistant and have an exceptionally long flexing life. Their recovery upon being stressed is slower than rubber, their hysteresis loss is greater, and they must be used at somewhat lower operating temperatures. Vinyl elastomers may be produced in any color including transparent and because they are thermoplastic and do not need to be cured, they may be formed or shaped economically by injection molding, calendering, extruding or other known means.

The other type of softer vinyl plastic which has somewhat different properties than those containing polyvinyl chloride is polyvinyl butyral. This material was developed originally for use as an interlayer in laminated glass and is much softer than the cellulose nitrate and acetate plastic formerly used in this application. When the war stopped the production of civilian automobiles, there was an excess manufacturing capacity for polyvinyl butyral. Accordingly, the material has been successfully adopted for the proofing of fabrics and for other applications in which rubber was chiefly used. Polyvinyl butyral is generally compounded with thermosetting resins for all uses except the laminated glass application.

Abstract of Polyester Talk

The Rubber-Like Polyesters: The products resulting from the condensation of ethylene glycol with succinic or sebacic acids are hard crystalline plastics melting at 100° and 74° C., respectively. When methyl groups are attached to some of the glycol residues (as by replacing some of the ethylene glycol with propylene glycol) the melting points of the plastics are lowered progressively, finally reaching ° C. or lower. The resulting "degraded" plastics are now gums at room temperature and resemble milled gum rubber in many respects.

The gum can be compounded with pigments and cured with benzoyl peroxide to yield typical rubbery vulcanizates of fairly high tensile strength and elongation. Properties can be varied with composition and with choice of pigment, but in general the outstanding features of this type of polyester rubber are oil resistance, heat resistance and absence of sulfur. They are particularly useful in applications where the corrosive effects of sulfur are to be avoided.

If an unsaturated acid is incorporated in the structure in amounts of about 15 to 25% the ester can be cured by combinations of sulfur and the usual accelerators. The sulfur-cured polyesters are outstanding in their heat resistance.

From a theoretical viewpoint the polyester rubbers are of interest in that they completely bridge the gap between plastics and rubber. The rubbery polyesters bear much the same relationship to the plastic polyesters that Butyl rubber bears to polyethylene. In these cases the function of the methyl groups is to reduce crystallinity of the plastics.

The polyesters are of particular interest in studies relating properties to structure since their structure is well known and can be varied at will by choice of intermediates.

Coming Events

June 22. Rubber & Plastics Div., A.S.M.E., Semi-Annual Meeting, William Penn Hotel, Pittsburgh.

June 23. Boston Rubber Group, Outing, Woodland Golf Club, Newton, Mass.

June 26-30. A.S.T.M., 47th Annual Meeting, Waldorf Astoria, N. Y. C.

June 28-29. S.A.E., National Transportation Meeting, Bellevue-Stratford, Philadelphia, Penna.

July 22. Chicago Rubber Group, Outing.

Sept. 13-15. Rubber Division, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

Nov. 15-19. Third National Chemical Exposition, Coliseum, Chicago, Ill.

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DINSMORE SEES BRIGHT FUTURE FOR ENTIRE RUBBER INDUSTRY

The future of the rubber industry appears as bright as any that can be mentioned and far above the average, Dr. R. P. Dinsmore, vice-president in charge of research and development of the Goodyear Tire & Rubber Co., told the National Association of Purchasing Agents at the Waldorf-Astoria Hotel in New York City on May 30. Dr. Dinsmore spoke on "Looking Ahead in the Rubber Industry."

"It is quite probable," said Dr. Dinsmore, "that the new synthetic industry, which has matured so rapidly under the stress of war, will prove almost as great a stimulus to the industry's future progress as did the advent of the popular-priced automobile. Even under adverse social conditions, this industry should progress better than many other less flexible or less firmly rooted in the economic needs of the world."

Projecting an estimate of rubber requirements of the United States through 1948, and of world rubber supply and demand through 1950, Dr. Dinsmore proceeded on "the basic assumption that the war will be essentially completed by a United Nations victory, by the end of 1946." In this event, he said, present available facts indicate a United States civilian need of 1,010,000 tons in 1948, a figure which compares with this country's highest previous consumption of 783,000 tons in 1941.

Rubber Allied to Automobiles

"I am quite aware," said the Goodyear scientist, "that the time period is inadequate for safe generalization. It is also important to observe that the major use for rubber, in this country and in the world, is for tires and tubes, in which the automobile tire preponderates. Therefore, to some extent, rubber consumption figures for the past twenty or thirty years merely reflect the growth of the automobile business. Certainly any major change in the pattern of that industry would alter the rubber consumption curve. Perhaps such a change is in the making. I shall make no effort to decide that question."

Continuing his estimates of potential American requirements for various classes of rubber goods for the next four years, Dr. Dinsmore set 1947 as the peak of passenger tire production in that period, with a total of 80,000,000 such tires being needed in that year for both original equipment and renewals. The peak of truck tire production in the same period was set as arriving in 1948, with a total of 13,400,000. Considerable increases also were forecast for consumption of rubber in mechanical goods and footwear production, as well as for other civilian uses, some of which will be new while others will continue pre-war developments.

During the four years following the assumed date of the war's end, Dr. Dinsmore estimated, the world's rubber demand may rise to 1,900,000 long tons by 1950, with a total supply in that year of 2,600,000 long tons with which to meet it. Of this supply 1,075,000 tons will be the product of American synthetic plants, 25,000 tons will be wild rubber and 1,500,000 tons will come from cultivated plantations.

"In order to estimate the availability of rubber," the Goodyear official stated, "we must consider the plantation situation. Of course, no one can say with certainty when the plantation areas will be recovered. Undoubtedly steps will then be taken for their rapid rehabilitation. Even so, small native estates will be the first to produce, because of simple equipment.

"The reorganization of labor and replacement of equipment on large estates will be a difficult and tedious job. The attitude of the natives may be uncooperative and international disputes are not unlikely. It is expected, therefore, that after complete re-possession the first year will not produce over 400,000 tons of rubber and the second year not more than 700,000 tons. It may require two more years to reach 1,500,000 tons output.

"Granted the validity of our reasoning thus far, the world may be facing a tight rubber situation for nearly four years after the war, unless we see fit to expand further our synthetic output."

Reverse Lend-Lease

According to the 15th report to Congress on our Lend-Lease operations, one-third of all the supplies and equipment currently required for our forces in the United Kingdom are provided by the United Kingdom as reverse lend-lease without payment by the United States. Included among products received under this reverse lend-lease arrangement by the 8th and 9th U. S. Air Forces up to the end of 1943 were 235,000 synthetic rubber shock absorbers, 5,000 collapsible rubber dinghies with devices for the release of parachutes at the time of hitting water, and 10,600 aircraft tires. These products were vital to the success of the operations of these Air Force units.

More Changes at Pharis Tire

Charles D. Boies, comptroller for the past seven years, and Allan Fisher, credit manager for the past ten years, have been elected treasurer and secretary, respectively, of the Pharis Tire & Rubber Co., Newark, Ohio. The promotions followed the resignation of William I. O'Bryan, who has been secretary and treasurer of the company for the past twenty-one years.

HIGH-POLYMER PHYSICS GROUP TO HOLD INAUGURAL MEETING

The inaugural meeting of the new Division of High-Polymer Physics of the American Physical Society will be held on June 23 and 24, 1944, at the University of Rochester, Rochester, New York. A program of approximately twenty selected papers on the elasticity, viscosity, and other physical properties of high-polymeric materials, as well as on the application of physical methods to manufacturing processes, has been arranged.

Recognizing the expansion in the applications of physics and physical techniques arising from the recent rapid development of the field of high-polymeric materials, the Council of the Society last November authorized the establishment of the Division of High-Polymer Physics. The object of the Division is the advancement and diffusion of the knowledge of the physics of high-polymeric materials, such as rubbers, textiles, plastics, pulp and paper, paints and varnish, and leather. The interests of the Division will be sufficiently broad to appeal to physical scientists in academic, industrial, and government laboratories. The initial enrollment of physicists in the Division has been very gratifying.

The inaugural program at Rochester is being sponsored by members of an Organizing Committee appointed to take charge of the affairs of the Division during the formative stage. This Committee consists of K. K. Darrow (chairman), R. B. Barnes, F. G. Brickwedde, W. F. Busse, P. Debye, J. H. Dillon, G. B. Pegram, A. E. Ruark, L. A. Wood, and W. J. Lyons (Southern Regional Research Laboratory, 2100 Robert E. Lee Boulevard, New Orleans 19, Louisiana), who is serving as secretary of the Committee.

Copolymer Corp. Operates Fleet

The activities of the special fleet at San Antonio, Texas, which is testing synthetic tires and tubes on a 24-hour, six-day week, for the Office of the Rubber Director, were briefly described in the April, 1944, issue of RUBBER AGE. It has since been called to our attention that this fleet is being operated for the ORD by the Copolymer Corporation of Baton Rouge, La., which also operates one of the copolymer plants for the government in the over-all synthetic rubber program. Mr. L. A. Werne is manager of the test fleet under the direction of the Copolymer Corp. which operates the fleet on a non-profit basis involving no fee of any kind. The Copolymer Corp., headed by A. L. Freedlander as president, was organized by seven rubber companies to do their share in conquering the rubber crisis which faced this country after Pearl Harbor.

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B. F. GOODRICH CO. SPONSORS LOS ANGELES GROUP MEETING

A near-record attendance featured the closing supper meeting of the current season for the Los Angeles Rubber Group, sponsored by the B. F. Goodrich Co., and held in the Mayfair Hotel in Los Angeles on June 6. L. L. Horchitz (Goodrich) presided as program chairman. The attendance by Goodrich employees was especially large.

Perhaps no speaker who has addressed the club at any of its meetings can claim a more enthusiastic response than the speaker at this meeting, Alonzo Baker, radio commentator, world traveler, and former head of various chambers of commerce in California, who spoke on "Does America Need a Foreign Policy?"

The point made by the speaker in his address was that this country does need a foreign policy, a policy based on a long view ahead, a definite policy in keeping with the conditions incident to a "shrinking world." Mr. Baker pointed out that for a century and a half we actually had no foreign policy whatever, met conditions somewhat casually as they arose, and trusted to luck and enthusiasm to get us by. This can no longer be done in a world where distance means nothing and where other nations plan courses with a half century view to the future, he said.

Question-and-Answer Period

The interest in the lecture was such that when a question period followed, all other portions of the formal program as planned were called off. Mr. Baker went into the present situation and sentiment in each of a large number of countries throughout the world, answering questions completely and immediately when asked, and answering with a snap that captured the admiration of the audience.

About ten new members were voted in, T. Kirk Hill acting as master of ceremonies in the initiation program which made these new men full-fledged members of the Group, a group that has been growing steadily since its inception.

Announcement of the summer outing was made in more detail than at the last meeting. The date has definitely been set as July 22 and 23 and the place is the Uplifters' Club at Santa Monica, while the theme this year is to be a military one. Last year the theme was "The Forty-niners." A charge of $12.50 and "ten red points" is being made, the latter in order that a steak dinner may be served. One hundred and twenty-five reservations are being accepted, it was pointed out, and the ranks were just about filled at the time of the meeting.

A book signed by a large number of members was presented to J. M. Robbins (Goodrich) who is being transferred to Bogota, Colombia. The door prize was a set of seven glasses and tray donated by the Hycar Chemical Company. Other prizes were bottles of choice wines donated by the Dubonnet Company.

Lukens Heads Own Laboratory

Alan R. Lukens

Alan R. Lukens, who has been associated with Thompson, Weinman & Co., Inc., for the past ten years as director of research, has left that organization and has taken over the premises and part of the Thompson-Weinman equipment at 11 Windsor St., Cambridge, Mass. The laboratory will be modernized and further equipped for the compounding of extender pigments in rubber, paper, paint and allied fields. Research having to do with the measurement of particle size distributions, surface phenomena and the effect of these upon various manufactures will be intensified as also will be supervision of industrial research in technical schools and colleges. Mr. Lukens, when chief chemist of the Richardson Company, was the inventor of the asphalt battery case, over 50 million of which have been made under his patents. Also developed under his direction was the colored slate granule coated roofings and shingles widely used for twenty years. From 1926 until he joined Thompson, Weinman & Co. in 1934, Mr. Lukens was associated with the Hood Rubber Co.

Changes at Boston Woven Hose

Due to ill health, A. C. Kingston, vice-president and general manager of the Boston Woven Hose & Rubber Co., Cambridge, Mass., has been obliged to relinquish a large part of his duties and has been appointed consultant to the president of the company on matters of sales policy. H. F. Maxon, who has been district sales manager of the New York and Pennsylvania districts for the past 17 years, has been appointed general sales manager of the company, while W. I. Lewis, who has been assistant to the general manager for the past 12 years, has been named assistant general sales manager.

HUBBARD-SHERIDAN-BERNSTEIN HEAD CHICAGO RUBBER GROUP

At a meeting of the Chicago Rubber Group held at the Morrison Hotel in Chicago, Ill., on May 19, attended by approximately 215 members and guests, the following officers were elected for the 1944-45 season: *Chairman,* Bruce W. Hubbard (Ideal Roller); *Vice-Chairman,* James P. Sheridan (N. J. Zinc); *Secretary-Treasurer,* Wilburn F. Bernstein.

The following were elected directors for two-year terms: *Rubber Manufacturers*—Paul Van Cleef (Van Cleef Bros.) and B. Kaufman (Dryden Rubber); *Suppliers*—C. M. Baldwin (United Carbon) and S. A. Weller (DuPont); and for one year terms: *Rubber Manufacturers*—H. I. Houlette (Inland Rubber) and D. M. Pratt (Marbon Corp.); *Suppliers*—W. H. Lussie (Vanderbilt) and J. R. Morath (Naugatuck Chemical). The Nominating Committee was headed by C. M. Baldwin as chairman.

The technical speaker at the meeting was Ira Williams, director of research of the J. M. Huber Corp., Borger, Texas, who gave an informal talk on the manufacture, properties and applications of the synthetic rubbers. Special entertainment was furnished by H. Walter Grote, midwestern representative of the Wilmington Chemical Corp., who gave an unusual demonstration of thought reading and subliminal control.

The Chicago group will hold its annual golf tournament and outing on Saturday, July 22. Further details on the outing will be made available shortly.

Northern California Group Meets

Approximately 40 members and guests attended the regular meeting of the Northern California Rubber Group, held at the Hotel Claremont in Berkeley, Calif., on May 25. Herman Jordan (DuPont) presented high-lites from the Spring Meeting of the Rubber Division, A.C.S., recently held in New York City, and also discussed some new DuPont compounding materials, including Permalux. Vic Vodra (Vanderbilt) then gave a short talk on Cumate and Cuprax, the two new copper accelerators for synthetic rubber recently announced by his company. A drawing was held for a refrigerator deodorizer, which was donated by the N. J. Zinc Co. and won by Mr. Jordan. Table favors were distributed through the courtesy of H. M. Royal, Inc. The death of Charles L. Bean, of the Bean Tire & Rubber Works, of San Jose, Calif., was announced at the meeting.

Atlantic Rayon Changes Name

The name of the Atlantic Rayon Corporation has been changed officially to Textron, Inc. The company's wholly-owned subsidiary, Textron, Inc., will cease to function July 1 and all transactions with the trade will be handled directly by the parent company.

CARBON BLACK PRODUCTION SHOWS INCREASE IN 1943

The carbon black industry in 1943 recovered from the reverses experienced in 1942 and almost reached the peaks attained in 1941 in both production and sales, according to a report by the Bureau of Mines of the Department of the Interior. Total production in 1943 reached 593,421,000 pounds, of which 379,923,000 pounds were produced by contact processes and 213,498,000 pounds by furnace processes, as compared with 574,006,000 pounds in 1942, of which 428,665,000 were made by contact and 145,341,000 by furnace processes, an over-all increase of 3%.

Total sales showed a 40% increase in 1943 over 1942, the figures being 629,300,000 pounds and 449,931,000 pounds, respectively. Of the 1943 total, sales were divided as follows: Rubber, 473,473,000 lbs.; Ink, 23,530,000 lbs.; Paint, 3,945,000 lbs.; Miscellaneous, 128,352,000. The miscellaneous figure includes exports.

Expansion in synthetic rubber manufacture, which calls for large amounts of the softer blacks, was reflected in the production of the furnace blacks which, as noted, increased 47% over the 1942 record. These blacks comprised 36% of the 1943 total as compared with 25% in 1942 and 17% in 1941. Contact blacks, which are principally of the channel type, declined 11%.

Stocks held by producers at the end of 1943 totaled 205,215,000 pounds, a decline of 15% from the 242,755,000 pounds held at the 1942 year-end. Stocks were heavily drawn upon in the latter part of the year when sales were far above production.

The amount of natural gas burned in the manufacture of carbon black in 1943, according to the report, was 6% below the volume used in 1942, this decrease in the face of increased production having been made possible by the increased output of plants manufacturing furnace blacks which obtain relatively high yields. The average yield of carbon blacks of all grades in 1943 was 1.88 pounds per thousand cubic feet of gas burned, compared with 1.71 pounds in 1942.

Other facts revealed by the report were that carbon black manufacturers paid an average of 1.47c per thousand cubic feet of gas in 1943, an advance of 0.18c over the 1942 average; that the average value of carbon black at the plants remained the same in 1943 as in 1942, at 3.41c a pound; and that seven new furnace-type plants were put into operation during 1943 and three channel plants were shut down or dismantled.

In connection with this report it is interesting to note that increases in production of carbon black totaling more than 2,000,000 pounds monthly were announced on May 18 by the Witco Chemical Co. Improvements now under way in present plants of the Continental Carbon Co., whose production is distributed solely by Witco, will increase its output of channel process black substantially and new construction planned will bring the total increase to some 50%.

It is also interesting to learn that American manufacturers of carbon black were recently asked by WPB to consider the construction of carbon black plants in Russia and Iran. It was pointed out that there are large untapped supplies of natural gas both in Russia and at the head of the Persian Gulf and transportation facilities are available. The possibilities of such plants are now under consideration.

Create Town of Goodyear

An Arizona community born of the present world-wide conflict has chosen "Goodyear" for its name. The new town of Goodyear is a settlement of more than 1,800 aircraft workers employed at the Goodyear Aircraft Co. plant four miles south of Litchfield Park. Included in the new town are the developments known as Westwood Manor, the Federal housing project called Avondale Circle, and the model Wingfoot Homes village of 24 houses along a U-shaped court.

Form New Scrap Rubber Firm

The Tanney-Costello Company was recently organized by S. A. Tanney and J. J. Costello, both formerly associated with the firm of A. Schulman, Inc. The new company, which maintains headquarters at 868 East Tallmdage Ave., Akron 9, Ohio, will deal exclusively in all grades of scrap rubber, including dealer operations and brokerage. Mr. Tanney originally entered the scrap rubber business by employment at the New York office of H. Muehlstein & Co., Inc., and subsequently was transferred to Akron, later being moved to the Pacific Coast. He resigned to return to Akron in the employ of the Schulman firm. Mr. Costello also was originally employed in the New York office of the Muehlstein Company, later becoming manager of the Boston office and still later of the Akron branch, succeeding Mr. A. Schulman in the latter position. For the past several years he has been associated with the Schulman firm.

Bank Features Vansul Exhibit

Inspired by civic pride in the products of local industry, the Citizens National Bank & Trust Co. of Englewood, N. J., recently inaugurated a series of educational exhibits featuring products "Made in Englewood." The first exhibit featured the products of Vansul & Company, manufacturers of rubber colors, pigments and fillers, covering the practical application of colors to both crude and synthetic rubber products. John de C. Van Etten heads the Vansul concern.

COMMERCIAL STANDARD IS SET FOR ALL HOSPITAL SHEETING

When the War Production Board found it necessary to curtail the use of rubber, neither crude nor reclaimed rubber was allotted for the manufacture of hospital sheeting for civilian hospitals. Consequently, the employment of rubber substitutes became necessary, with the result that hospital purchasing agents found it increasingly difficult to decide between satisfactory and unsatisfactory materials offered.

In order to provide hospitals with a guide in selecting satisfactory products, the American Hospital Association requested the assistance of the Division of Trade Standards of the National Bureau of Standards in the establishment of a commercial standard. With the cooperation of the leading manufacturers and a committee of the American Hospital Association, a commercial standard has been prepared and adopted by the industry as Hospital Sheeting for Mattress Protection, Commercial Standard CS114-43.

The specification is of the "performance" type, almost complete latitude being allowed the manufacturer in the selection of fabrics and coating or impregnating materials. The standard covers requirements and methods of tests for fabrics coated on both sides or impregnated with a suitable compound, and includes requirements for thickness, breaking strength, tearing strength, resistance to mineral oil and disinfectants, resistance to sterilization, accelerated aging, cracking, and moisture penetration. A burning rate limit is included to prevent the use of flammable materials that would be a fire hazard.

Copies of Commercial Standard CS114-43 are obtainable from Superintendent of Documents, Government Printing Office, Washington 25, D. C. The price is 5 cents.

Combine Rubber and Co-Ro-Lite

A method of combining rubber and molded Co-Ro-Lite, a sisal fibre-resin material, has been developed by the Columbian Rope Co., Auburn, N. Y. The original development, called the Co-Ro-Felt pad, reveals a product combination of two entirely dissimilar materials —a pad which has different characteristics in contiguous portions—yet molded in one operation. Two different bonding materials are required. The center or hub is vegetable fibre impregnated with Durez phenolic resin, product of Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., while the outer section is vegetable fibre impregnated with a compounded latex. The result is a rigid hub of excellent impact strength and a resilient, flexible outer circular section. The combination can be made of natural or synthetic latex and Co-Ro-Lite. Gasoline tank fittings are being made of the new combination material.

KELLY-SPRINGFIELD TIRE CO. REACHES 50th ANNIVERSARY

The Kelly-Springfield Tire Co., of Cumberland, Maryland, now affiliated with the Goodyear Tire & Rubber Co., is this year celebrating its fiftieth anniversary. In that span, the company has witnessed and made many valuable contributions to the tire manufacturing art.

Kelly-Springfield got its start in 1894 when Arthur W. Grant, of Springfield, Ohio, developed a satisfactory tire for use on horse-drawn vehicles. Lacking finances, he secured backing from Edwin S. Kelly, also of Springfield, and the two organized the Rubber Tire Wheel Co. Patents covering the development were issued to the new company in 1896.

Van H. Cartmell, at that time selling bicycle tires in the Boston area for the Consolidated Rubber Tire Co. of New York, took over exclusive sales rights of the tires made by the Rubber Tire Wheel Co. and later bought out both Grant and Kelly. Still later Mr. Cartmell became head of the Consolidated Rubber Tire Co. and changed the name of the firm to the Kelly-Springfield Tire Co.

As demand for the company's carriage tires grew, these tires then being produced in reel lengths, another factory, known as the Buckeye Rubber Co., was secured in Akron. The development of the automobile resulted in heavy demands and the need for new production facilities was soon evident. Eventually, a site was chosen in Cumberland, Maryland, and a huge, modern plant, planned just before the United States entered the first World War, was completed in 1920.

In the 1920's many of the executives associated with the concern since its start, including Mr. Cartmell, passed on, and operating and sales efficiency gradually decreased. In the early 1930's it was evident that drastic reorganization was essential, and this was accomplished in 1935 when the present management, headed by E. S. Burke, who had secured his training with Fisk and Chrysler, took over.

Under the new management, the position of Kelly-Springfield in the tire field steadily improved, until the Japanese sneak attack in the Far East resulting in the cutting off of our crude rubber supplies. The Cumberland plant was swiftly converted into an ordnance unit making munitions and was operated as such a unit until September of last year. Since that time the plant has been reconverted to tire production and Kelly-Springfield is building new facilities so that the plant will soon be producing tires at nearly double its prewar peak.

Firestone has presented an autogiro to the Department of Aeronautical Engineering of Princeton University. The autogiro, which will be used as a flying laboratory for research on rotary wing aircraft, was manufactured by G & A Aircraft, Inc., a Firestone subsidiary.

U. S. Rubber Promotes Brown

E. G. Brown

Ernest G. Brown, who has seen service as general manager of the munitions division of the U. S. Rubber Co., has been named general manager of the mechanical goods, general products, Lastex yarn and rubber thread divisions of that company, succeeding Willard H. Cobb, recently elected a vice-president and member of the executive committee of the company. Mr. Brown is a native of New Haven, Conn., and a graduate of the Sheffield Scientific School of Yale University. He served in the first World War and joined U. S. Rubber in 1929 at New Haven. He was subsequently transferred to the Bristol, R. I., plant as assistant factory manager and made factory manager of that plant in 1931. Later, he served as production manager for the six plants engaged in the manufacture of general products, drug sundries, insulated wire and mechanical goods. In 1942 Mr. Brown was named head of the shell loading division of the company, when that department was organized, and a year later was made general manager of the munitions division.

Nevillac OA Introduced

Nevillac OA, a new liquid resin of improved odor, has been introduced by the Neville Co., Pittsburgh, Penna., as the first of a series of improved grades which are being developed to enlarge the Nevillac resins group. The new material is similar to Nevillac 10° (PHO), differing chiefly in improved odor and superior color retention. Fields of use of the new Nevillac include adhesives of the waterproof, optical, shoe, packaging and pressure-sensitive types and artificial leather and leather finishes. Nevillac OA is soluble in almost all organic liquids and is compatible with most synthetic resins, as well as GR-S and the Buna N-type synthetic rubbers.

COMPLETE PROGRAM ARRANGED FOR ASTM'S 47th MEETING

Over one hundred technical papers and reports will be presented in 16 technical sessions at the Forty-Seventh Annual Meeting of the American Society for Testing Materials, which will be held at the Waldorf-Astoria in New York City on June 26 to 30. The first day of the meeting—June 26—will be devoted to technical committee meetings.

Features of this 1944 meeting, at which the Society will take action on a number of its widely used specifications and tests, will include round-table discussions on the following: Centrifugal Castings, Classification of Industrial Waters, Symposium on Colorimetric and Photometric Methods of Analysis, and several addresses—one on "Minerals in War and Peace," by Dr. C. K. Leith, the address of the President, Dean Harvey, and the Marburg Lecture this year by Dr. Harold DeWitt Smith on "Textile Fibers—an Engineering Approach."

The meeting of Committee D-11 on Rubber Products, of which Simon Collier, of the Johns-Manville Corp., is acting chairman, will take place on Tuesday afternoon, June 27. The report of the committee, on which action will occur, follows:

New specifications for cellular rubber products and methods of test for stiffening of vulcanized elastomers at low temperatures are recommended for publication as tentative.

Revisions are recommended in the tentative specifications for chloroprene sheath compound for electrical insulated cords and cables where extreme abrasion resistance is and is not required and for insulated wire and cable, performance synthetic rubber compound, in the tentative methods of testing sponge rubber products, automotive hydraulic brake hose, automotive air brake and vacuum brake hose, and in the tests for changes in properties of rubber and rubber-like materials in liquids, for indentation of rubber by means of the durometer, and for low-temperature brittleness of rubber and rubber-like materials.

It is recommended that the tests for resistance to light checking and cracking of rubber compounds and for tear resistance of vulcanized rubber be adopted as standard without revision.

Anaconda Again Accused of Fraud

Alleged failure of the Anaconda Wire & Cable Co. to make prescribed tests on wire and cable made at its Marion, Ind., plant for military use and for lend-lease was the basis of a new action by the government on May 16. The Department of Justice filed a civil complaint on that date charging that invoices, affidavits and bills submitted by the company in connection with its claims for payment for the products were fraudulent. The complaint asked the statutory penalty of $2,000 for each such allegedly fraudulent document.

NAMES IN THE NEWS

DR. EUGENE MCCAULIFF, until recently engaged in consulting and advisory activities for the chemical industry, has joined the Glyco Products Co., Inc., Brooklyn, N. Y., as technical sales director.

HARRY E. SMITH, general manager of the Manhattan Rubber Manufacturing Division, and ROBERT B. DAVIS, general manager of the Raybestos Division, have both been elected vice-presidents of Raybestos-Manhattan, Inc., Passaic, N. J. Both are directors of the company.

HOWARD E. MALCOMB, until recently manager of sales production coordination of the tire division of the U. S. Rubber Co., has been appointed to take charge of farm and heavy service tire activities of the company's Fisk Division.

H. F. SCHWARZ, formerly employed at the research laboratories of the Witco Chemical Co. in Chicago, has joined the research laboratories of the Sherwin-Williams Co., also Chicago, where he will work on the development of new chemicals for use as compounding agents for rubber and synthetic rubber.

A. N. GUY, associated with the U. S. Rubber Co. since 1929, has been appointed manager of the automobile tire department of the company's Fisk Division.

W. R. Hucks, formerly manager of the raw materials division of the B. F. Goodrich Co., Akron, and who has been with the operating division of the Rubber Reserve Co. since 1942, has been named production manager of all government-owned synthetic rubber plants.

C. B. POOLER, well-known electrical and mechanical engineer, has been appointed vice-president in charge of manufacturing of the Philip Carey Manufacturing Co., Cincinnati, Ohio. The company operates nine plants.

HOWARD C. STEINER, assistant managing director of the Goodyear Tyre & Rubber Co. (Australia) Ltd., Granville, New South Wales, has been named managing director of that Goodyear subsidiary, succeeding W. G. KITHER, who has resigned due to poor health.

C. P. JOSLYN, associated with the Goodyear Tire & Rubber Co., Akron, since 1926, has been named sales manager of the newly-created Synthetic Sales Division. Operating in this division and responsible to MR. JOSLYN will be the managers of plastics, Pliofilm, flooring and Airfoam sales.

BOYD BRIDGWATER, vice-president of the Bridgwater Machine Co., Akron, was recently named a member of a five-man executive committee to start Akron on its postwar planning program. The committee, officially known as the Citizens Planning Committee, will have a budget of $40,000 to $50,000.

FELIX G. TANNER, associated with the B. F. Goodrich Co. since 1932, has been named factory manager of the company's Cadillac, Mich., plant, succeeding ROBERT W. RANSOM, who has resigned to enter other business.

GEORGE E. HULSE, associated with the General Laboratories of the U. S. Rubber Co. at Passaic, N. J., as a department head for the past several years, has left that organization and is now affiliated with the American Container Corp. at its Depew, N. Y., plant.

CHARLES F. PHILLIPS, director of the Automotive Supply Rationing Division of OPA since June, 1942, and who took a leading part in developing the tire rationing program, has been appointed Deputy Administrator for Rationing of that government agency.

FRANK MOODY BIFFEN, for 15 years a member of the staff of Foster D. Snell, Inc., consulting chemists and engineers of Brooklyn, N. Y., was recently elected to Fellowship in the Institute of Chemistry of Great Britain and Ireland.

DR. VICTOR E. WELLMAN, until recently director of purchases for the chemical division of the B. F. Goodrich Co. at Akron, has joined R. W. Greeff & Co., New York City, sales agents and importers of industrial and pharmaceutical chemicals.

RALPH T. LAPORTE, chief chemist of the Seiberling Rubber Co., Akron, has been elected president of the new Seiberling Country Club. He was scheduled to receive the club lease from F. A. SEIBERLING, board chairman, at dedication ceremonies early this month.

R. D. VICKERS, associated with the Goodyear Tire & Rubber Co. since 1929, has been placed in charge of plastics and chemical sales in the eastern region of the United States for that company. He will maintain headquarters in New York City.

J. C. RAY, sales manager of the Fisk Tire Division of the U. S. Rubber Co., was recently elected president of the New York Sales Managers' Club. He previously served as vice-president and chairman of the program committee.

Greer With Continental Carbon

Harvey G. Greer

Harvey G. Greer, lately of the Rubber Reserve Company, has joined the technical service staff of the Continental Carbon Company to handle its growing line of products for the rubber and synthetic rubber industries. Mr. Greer is especially qualified for his new work by long experience in the rubber industry. Following his graduation in chemical engineering from Ohio State University in 1929, Mr. Greer was for more than 13 years associated with the Goodyear Tire and Rubber Company in compound development for tires, tubes and mechanical rubber goods. In 1942, he joined Rubber Reserve in Washington, where his experience was brought to bear on problems of compounding synthetic rubbers. Mr. Greer will make his headquarters in Continental Carbon's Akron office. Expansion of Continental's service to the rubber industry includes greatly enlarged production of its complete line of carbon blacks. The distribution of all Continental Carbon blacks is handled by the Witco Chemical Company.

L. J. WALDRON, who was associated with the Pennsylvania Rubber Co., Jeannette, Penna., for some 27 years, and who has been serving as Washington representative of the Dayton Rubber Manufacturing Co. for the past 18 months, has been appointed assistant sales manager of the tire division of the latter company. He will make his headquarters in Dayton, Ohio.

W. E. LEISTNER, associated with the Vulcan Proofing Co., Brooklyn, N. Y., for the past 12 years, has left that organization and is now chief chemist of Duralene Processed Fabrics, Inc., proofed goods manufacturers, also of Brooklyn.

WANTED: Copies of the February, 1944, isue of RUBBER AGE. We will pay 50c for each copy returned.

TWO TECHNICAL PAPERS GIVEN AT NEW YORK GROUP MEETING

Two interesting technical papers featured the May meeting of the New York Rubber Group, held on May 26 at the Building Trades Club in New York City as an alternative to the usual summer outing. Approximately 225 members and guests attended the meeting.

The papers presented were: "The Heat Problem in GR-S Carcass Stocks," by J. G. Hendricks of the National Lead Co., and "The Carbon Spectrum for the Rubber Compounder," by C. W. Sweitzer and W. C. Goodrich of the Columbian Carbon Co. Dr. Sweitzer presented the latter paper.

In addition to these two papers, a new and comprehensive sound movie on "Synthetic Rubber," recently completed by the Bureau of Mines, was shown through the cooperation of that Bureau. The film traces the early history of synthetic rubber, from the discovery of isoprene on up to the present day manufacture of GR-S in the government program. Accordionists entertained during the dinner hour and a complete floor show, consisting of variety acts, was presented after dinner. Abstracts of the two technical papers follow:

Abstracts of the Papers

The Heat Problem in GR-S Carcass Stocks: The most serious problem in the compounding of GR-S is the development of satisfactory tires. The crux of this problem centers around the generation of heat and the resulting deterioration due to this heat. For a satisfactory or even acceptable solution both low heat build-up and heat stability must be imparted to the GR-S compound.

The hypothesis is presented that during vulcanization sulfur combines in more than one type of linkage. It follows in this discussion that thermodynamic and steric factors result in a tendency toward a relatively greater portion of sulfur combining initially in GR-S in less stable linkage(s). Heat aging is believed to cause rearrangement of such bondings into additional more stable intermolecular linkages resulting in brittleness. It is pointed out that when speedy and efficient acceleration is used that this tendency is minimized. There is cumulative benefit in that low sulfur may then be used to impart heat stability.

An accelerator combination is presented which shows improved heat build-up and heat stability. This combination consists of two parts of red lead, 0.75 part of benzothiazyl disulfide and 1.5 parts of sulfur.

Comparison of this compound with blanks representative of currently accepted carcass accelerator combinations indicates appreciable improvement in heat build-up and heat resistance whether these characteristics are considered individually or collectively.

The Carbon Spectrum for the Rubber Compounder: Rationalization of the colloidal carbon effects in rubber can be accomplished by the rubber compounder through the following considerations: (1) Recognition of the fundamental properties of colloidal carbons; (2) Appreciation of the effect of these properties on the behavior of carbons in rubber compounds; (3) Evaluation of these basic carbon properties by simple non-rubber tests.

The carbon spectrum includes the gamut of available types and grades of colloidal carbon offered to industry, ranging from the coarse thermal types to the finest channel grades. The behavior of any or all of these carbons in rubber can be satisfactorily explained on the basis of the three fundamental carbon properties, viz.:

Surface—A measure of particle size and the total surface available for reinforcement.

pH—The clue to the chemical activity of the carbon surface.

Structure—The measure of agglomeration in carbons and the degree of its persistence.

By an understanding of these fundamental properties the rubber compounder can extend the versatility of the colloidal carbon family to give new effects and new standards of performance.

Surface is the dominating influence in GR-S as well as Hevea. Rebound in both instances is dominated by surface. Tensile and energy are likewise dominated by surface, except for the anomalous behavior of structure carbons. Modulus in GR-S is influenced by surface. pH dominates the rate of cure picture in both Hevea and GR-S, with retardation given by low pH carbons and acceleration by high pH carbons. In GR-S, however, total surface may in some cases equal pH in its cure effect.

Structure effects in Hevea and GR-S show up in processing, modulus and hardness. Normal structure is associated with the standard reinforcing carbons. Super-normal structure gives higher modulus and hardness than expected on the basis of surface, while sub-normal structure results in somewhat lower modulus and hardness values.

Surface values can be closely estimated by a mineral oil color test. Using anchor points provided by the electron microscope, a color-surface graph provides a ready means for obtaining surface values on unknown carbons. Correlation of color with rebound is excellent.

The availability of total surface is conveniently estimated by a tinting strength test. Considering the other factors that can influence tensile, the correlation of tinting strength with tensile is good.

pH is most readily measured on a carbon-water slurry. Correlation with rate of cure is good, particularly where alkali accelerators are used.

An oil absorption test provides the simplest means for evaluating structure and its quantitative expression "Structure Index." Correlation with modulus is good, considering the effect of compounding and cure variables.

Electrical conductance of carbons in rubber compounds can be assessed with a fair degree of accuracy by a simple dry resistivity test on the original carbon. In order, decreased volatile, finer particle size, and increased structure improve conductance properties of carbons.

By evaluation of only a few basic carbon properties by simple tests, the rubber compounder has the means for predicting fairly closely the behavior of carbons in Hevea and synthetic rubber.

Shattered Tire Is Reminder

Shattered military tires, similar to the one pictured above, frame the daily attendance bulletins in departments throughout the Cleveland plant of the Industrial Rayon Corp. These tires act as a daily reminder of the Army's dependence on rayon workers now producing rayon tire yarn, cord and fabric. Although no figures are available, the use of these tires is believed to have cut down absenteeism at the plant.

Towne Joins Rubbercraft

Ralph C. Towne, long associated with the lighter-than-aircraft field and one of the major developers of rubber life rafts in the United States, has joined the Rubbercraft Corporation of America, Inc., as general manager and engineer in charge of production. The Rubbercraft Corporation, of which A. Ralph Alderman is president and Louis F. Garson, vice-president, operates plants at both New Haven and Wallingford, Conn. Mr. Towne's experience goes back to 1915 when he was associated with the Connecticut Aircraft Co. of New Haven which built the Dirigible D-N for the Navy. Later becoming interested in life saving rafts, he perfected a method of automatically inflating these rafts, and still later was instrumental in having the Navy adopt such rafts as standard equipment on Navy aircraft.

Definition of a Chemist

The following definition of a chemist was adopted by the Council of the American Chemical Society on April 3, 1944:

A chemist is one properly versed in the science that treats of the composition of substances and the transformations they undergo.

Both education and experience are essential to the qualification of a chemist and in order that the meaning of the word "properly" shall be adequately determinable, the following specifications shall apply in respect of that word's relationship to the qualifications of a chemist.

(a) Any person who has completed the requirements for a degree in chemistry or chemical engineering, and is engaged in the field of chemistry in gaining experience, shall be deemed to be properly qualified as a chemical interne. Such a chemical interne in the course of his professional work may of necessity be required to engage upon and learn many operations of a purely technical or nonprofessional nature the better to fit himself for more advanced work in the field of chemistry.

(b) Any person who has completed the requirements for a degree in chemistry or chemical engineering and has been certified to have completed the minimum requirements for professional acceptance by an educational institution approved by the American Chemical Society, and who has had two years of experience in professional chemical or chemical engineering work or two years of graduate study in chemistry or chemical engineering, shall be deemed to be properly qualified as a chemist.

(c) Any other person who has completed the requirements for a degree in chemistry or chemical engineering, and who, in addition, has worked for a period of five years in professional chemical or chemical engineering work, shall be deemed to be properly qualified as a chemist.

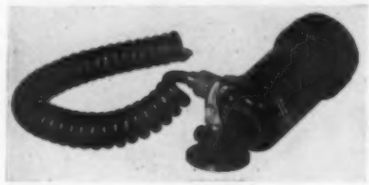
(d) Any person who by accomplishment is recognized generally in the chemical profession as being particularly well versed—that is to say, a specialist—in one or more branches of chemistry or chemical engineering, shall be deemed to be properly qualified as a chemist.

Fraser Joins Monroe Equipment

D. F. "Don" Fraser, who has served as technical assistant to the Rubber Reserve Co. and technical consultant on neoprene to the Office of the Rubber Director for the past 15 months, has joined the Monroe Auto Equipment Co., Monroe, Mich., as manager of that company's rubber division. Prior to government service, Mr. Fraser spent six years with the rubber laboratory of E. I. du Pont de Nemours & Co., Inc. Monroe Auto Equipment is reported to have developed an improved method of molding rubber products, further details of which will be made available in the near future.

Ingenious Cockpit Lamp

A single flash of light sighted by hostile eyes might easily spell disaster for night flying pilots and their crews during combat periods. Since occasional scrutiny of the instrument board, however, is



essential for perfect flying, a cockpit lamp indiscernible outside the plane is an obvious necessity. The X-244 cockpit lamp, made by Electronic Laboratories, Inc., Indianapolis, Ind., is described as such a lamp. Employing ultra-violet lens, the X-244 is equipped with control switches and rheostat which enables the operator to control the amount of light diffused. Covering the lens is a shutter which, when closed, shuts off light. Immediately back of the lens is an iris which permits focussing of the light to a spot or a flood. An important feature of the lamp is its retractable, rubber-jacketed, electrical cord, a product of Cordage, Inc., an affiliate of the Kellogg Switchboard & Supply Co., Chicago. Through a special process employed in permanently molding the rubber outer covering containing the conductor into a spiral shape, this cord can be stretched to approximately seven times its contracted length.

Advisory Panel Formed

As expected, the State Department at Washington, D. C., has formulated a special rubber advisory panel which will serve as a consulting body on all matters concerning rubber and rubber substitutes. Members of the combined industry-government group, announced on June 8, include the following: F. B. Davis, Jr. (U. S. Rubber), Stuart Hotchkiss (Cambridge Rubber), L. R. Jackson (Firestone), P. W. Litchfield (Goodyear), Harry E. Smith (Manhattan Rubber), A. L. Viles (R.M.A.), John L. Collyer (Goodrich), J. W. Bicknell (Rubber Development Corp.), William L. Batt (W.P.B.), H. J. Klossner (Rubber Reserve Co.), L. D. Tompkins (O.R.D.), and R. D. Young (Rubber Trade Association of N. Y.).

Marshall Heads Carlisle Tire

Furber Marshall, president of the Pharis Tire & Rubber Co., has been made president and chairman of the board of the Carlisle Tire & Rubber Co., Carlisle, Penna. Pharis recently acquired a substantial interest in the Carlisle concern. R. W. Atkins, a partner in Shearson, Hammill & Co., has been made a director of the latter company.

Neoprene-Coated Delousing Bag

Development of a delousing bag for individual treatment of soldiers' and sailors' clothes is said to mark a big improvement over the method of killing infestations used in the first World War. The bag is constructed of neoprene-coated cotton fabrics produced by the Fabrikoid Division of E. I. du Pont de Nemours & Co., Inc. The fabric is two-ply, combined as well as surface-coated with the neoprene. Strapping and cement, with which the bag is put together, are DuPont developments. One of the largest makers of the bag is the Dorset Manufacturing Company, New York City. To delouse his clothes, the service man inserts a glass ampule of methyl bromide, wrapped in cloth, into an inside pocket of the bag. He then dumps his whole outfit, including shoes, into the bag and rolls it up at the top. The volatile liquid is dispersed by stepping on the glass ampule and walking over the whole bag to assure thorough permeation of the contents.

Johnson Completes New Plant

The Johnson Rubber Co., Middlefield, Ohio, has completed construction of its new plant which replaces the one destroyed by fire some six months ago. The plant, largest in the Middlefield area, covers approximately 30,000 square feet, and includes many modern features for the comfort and efficiency of employees. Piping for conducting gas, steam and oil for heating are all underground, as are all electric wires. Offices in the new plant are on a mezzanine floor, overlooking production lines.

Elmhurst Opens New Office

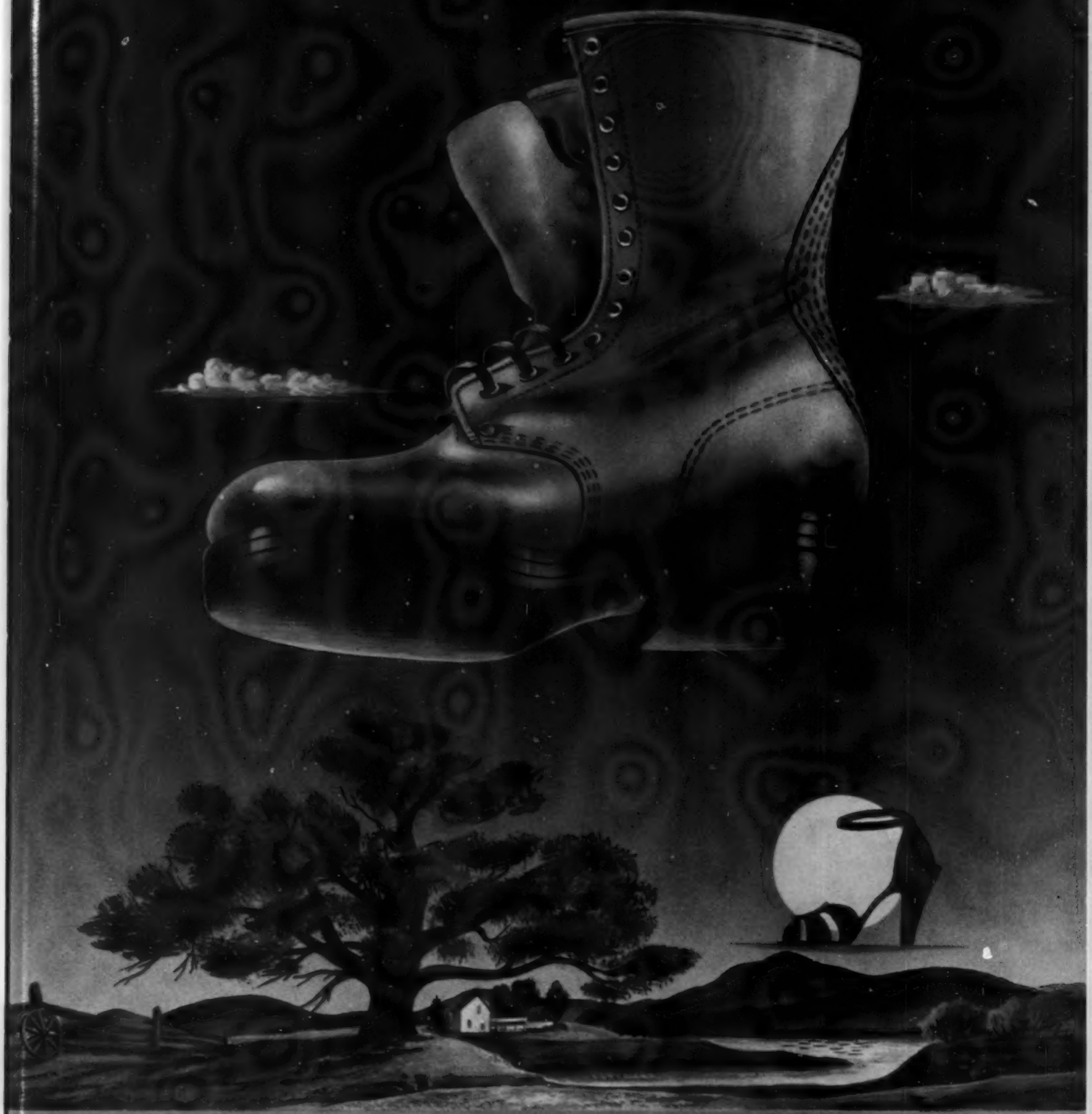
The Elmhurst Rubber Co., Inc., manufacturers of molded sponge and solid rubber products, which has devoted all of its manufacturing facilities to the production of war goods since Pearl Harbor, recently opened a new office building on the company's property at Elmhurst, L. I., N. Y., adjacent to its factory. The new office is a modern, one-story, white stuccoed, concrete structure and adds greatly to the convenience of both the company and its customers. George E. Jeandheur is president of the concern.

Cites "Rubber Life" Advertising

The Federal Trade Commission has ordered the Belt Oil & Chemical Co. and Overman & Co., both of New York City, to stop alleged misrepresentations in connection with the sale of "Rubber Life," a coating preparation for tires and other rubber products. The Commission contends that the statements that "Rubber Life" is "an answer to your tire-saving problem" and that it "will add up to 25 per cent more tire mileage" are false and misleading.

Shoe Adhesive Base Materials

We supply adhesive manufacturers with synthetic rubber latex compounds and dispersions of reclaimed rubber and synthetic resins.



Naugatuck Chemical
DIVISION OF UNITED STATES RUBBER COMPANY

Dispersions Process, Inc.
UNDER MANAGEMENT UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, NEW YORK 20, N. Y.
In Canada: DOMINION RUBBER COMPANY, LTD., MONTREAL

TIRE FABRIC TREATMENT
produces superior tires
Dispersions Process, Inc.
UNDER MANAGEMENT UNITED STATES RUBBER COMPANY
1230 SIXTH AVENUE, NEW YORK 20, N. Y.
In Canada: DOMINION RUBBER COMPANY, LTD., MONTREAL

FINANCIAL NEWS

Thermoid Company

First Quarter: Net profit of $136,419, or 19c each on 600,000 common shares, which compares with $242,475, or 46c a share, in the corresponding quarter of the previous year. The report for the current quarter does not include earnings of the Joseph Stokes Rubber Co., recently acquired by Thermoid, and it is estimated that such earnings should add approximately $50,000 to profits.

American Cyanamid Co.

First Quarter: Net income of $1,121,384, equal to 35c each on 2,666,026 common shares after dividend requirements on the preferred stock, which compares with $1,440,925, or 48c each on 2,639,026 common shares, in the corresponding quarter of 1943.

Columbian Carbon Co.

First Quarter: Net profit, before renegotiation, of $859,654, or $1.60 a share, which compares with $842,399, or $1.57 a share, in the 1943 quarter. Consolidated working capital on March 31, 1944, amounted to $10,538,854, an increase of $2,369,180 over the previous year.

Tyer Rubber Company

Year Ended February 29: Net income of $98,625, after provision of $387,887 for taxes, which is equal to $3.08 a common share and which compares with $111,562, or $3.57 a common share, reported for the previous fiscal year, when $417,879 was provided for taxes.

Lee Rubber & Tire Corp.

Six Months Ended April 30: Net profit of $644,863, equal to $2.67 a share, which compares with $602,585, or $2.50 a share, for the corresponding period of the previous fiscal year. Net sales amounted to $13,295,035 and $11,528,927, respectively.

Norwalk Tire & Rubber Co.

Six Months Ended March 31: Net profit of $84,827, after provision of $180,365 for income and excess profits taxes, which compares with $61,246 in the six months ended March 31, 1943, after provision of $84,000 for taxes.

Anaconda Wire & Cable Co.

First Quarter: Preliminary report indicates net profit of $325,291, equal to 77c a share, as compared with $280,928, or 67c a share, reported for the corresponding quarter of the previous year.

John Waldron Corp.

For 1943: Net profit of $123,253, after provision of $33,625 for depreciation and $486,720 for Federal income and excess profits taxes. According to the report unfilled orders at the year-end amounted to $1,675,935, "enough to keep the company in business for months."

Introduce Pliolite S-1

Pliolite S-1, a synthetic rubber substitute for Pliolite, the cyclized derivative of natural rubber made by reacting rubber with halide salts of amphoteric metals, has been developed and introduced by the Goodyear Tire & Rubber Co., Akron. The synthetic material is said to have generally the same range of usefulness and applications as its natural rubber forerunner and for the time being its use will probably be confined to insulating wire and cable for the military forces. It was disclosed that a special type of synthetic rubber was developed for Pliolite S-1. After being transformed to a resin, this rubber is integrated by chemical and mechanical processes with GR-S. Potential postwar uses of the new material are reported to include golf ball covers, safety and football helmets, shoe quarterlinings, and other materials where shock absorption and abrasion resistance are important.

Cerex—A New Thermoplastic

Cerex, a new thermoplastic, said to be the first ever developed that can hold its shape and strength in boiling water and yet can be molded by the fastest, most economical methods, has been announced by the Monsanto Chemical Co., St. Louis, Mo. By virtue of its ability to withstand sterilization, the new material is said to open up an entirely new field of industrial and household applications. Cerex is reported to be readily moldable in standard molding machines, and to combine high resistance to heat with resistance to strong, corrosive chemicals, excellent electrical insulating properties, and high rigidity and strength.

New Plant for Ohio Rubber

Ohio Rubber Co., Willoughby, Ohio, is reported to have purchased the building formerly occupied by the Art Furniture Co. in Meadville, Penna. The plant will be used for the production of mechanical rubber goods, according to the report, and will employ approximately 100 when in full operation.

Joins Wilmington Chemical Corp.

Ralph B. Symons

Ralph B. Symons, who recently joined the firm of E. F. Drew & Co., Inc., at Boonton, N. J., has left that organization to become affiliated with the Wilmington Chemical Corporation of New York City. He will act as technical representative covering the Eastern section of the country and Canada. A graduate of the University of Toronto, Mr. Drew has been associated in the past with Dunlop, Canada Wire and Firestone.

Dewey Receives Honorary Degree

The honorary degree of doctor of science was conferred on Rubber Director Bradley Dewey by the University of Akron at commencement exercises held at the University on June 4. Col. Dewey, a graduate of Harvard and M.I.T., was the guest speaker at the exercises, his topic being "Synthetic Rubber and the University of Akron—Now and in the Future." In his address, Col. Dewey reviewed the important role played by Akron in the development of both the natural and synthetic rubber industry, and stated that "war-born synthetic rubbers will in the future offer Akron an opportunity to go forward."

SAE Sets Transportation Meeting

The National Transportation and Maintenance Meeting of the Society of Automotive Engineers will be held at the Bellevue-Stratford Hotel in Philadelphia, Penna., on June 28 and 29. Included among the seven papers scheduled are those on "What Truck and Bus Operators Should Know About Synthetic Tires," by J. E. Hale of the Firestone Tire & Rubber Co., and "Employment of Electronics for Effecting Tire Vulcanization," by Lt. Col. C. W. Vogt, chief, technical staff for supply, Transportation Corps, War Department.

CANADIAN NEWS

The second walkout within a week of 1,500 rubber workers at the Dominion Rubber Company's plant at St. Jerome, Quebec, ended May 31 when representatives of the Federal Rubber Workers Union and the company agreed to lower the standard work units demanded from each worker to a mutually acceptable base which "will not endanger the health of workers" as claimed under the old standard by the union. The workers through their representatives agreed to return to work June 1, Max Swerdlow, representing the Trade and Labor Congress of Canada, declared.

The men agreed to return to their jobs after their representatives and company officials signed a new contract according to which "a time study engineer will be assisted by a representative of the workers in his work which regulates the number of units making up the regular standard and quantity of work demanded from each employee."

The new contract stipulates that any differences which may still occur during the fixing of mutually acceptable rates and standards for the work of the employees be submitted to the Regional War Labor Board for a decision. The contract also mentioned that any revision of rates will not be effective until it has been approved by the Regional War Labor Board. The changes will be made retroactive to June 1.

A one-year agreement between the Dominion Tire Company, Kitchener, Ontario, and Local 80 United Rubber Workers of America (C.I.O.) went into effect on May 26. The agreement follows a lengthy period of negotiation and officials of both union and management expressed satisfaction with its conditions. The majority report of the conciliation board, tabled recently, favored a maintenance of membership clause in the new agreement, while the minority report suggested a check-off system. While agreeing with the majority report, union officials sat down with the management and agreed to accept the minority report, featuring the check-off clause and granting improved negotiations and grievance procedure over the old agreement. The new agreement was ratified in its entirety by the international office of the United Rubber Workers of America.

Synthetic rubber tested by Canadian corset manufacturers is proving a satisfactory substitute for natural rubber, W. A. Rook, president of the Canadian Corset Manufacturers' Association and of the Canadian H. W. Gossard Co., Ltd., recently declared.

"All Canadian manufacturers," he said, "have been testing elastic made of synthetic rubber on various models, for months, and it is proving quite satisfactory. The difficulty now is that there is practically no neoprene thread available for civilian use, but when it is, retail customers may rest assured that it will wear as satisfactorily as does natural rubber thread, and that they will not be conscious of the difference between the natural and synthetic stuff in their foundation garments."

Forms and uses of synthetic rubber were discussed at a meeting of the Purchasing Agents Association held at the Mount Royal Hotel in Montreal on May 16 in addresses given by two representatives of the Goodyear Tire and Rubber Company, Ltd.

W. G. Britt, public relations officer of the firm, spoke on the five different types of synthetic rubber which have been developed during the critical shortage of crude rubber. George W. Davies, assistant manager of the firm, spoke on the mechanical uses of the product. He said in concluding his address that a lot of difficulty was encountered in the production of the synthetic product. New difficulties arose with each shipment of the material, he said.

The evening closed with the showing of a motion picture indicating the many uses of the product, including its use in planes, tanks, and practically every type of weapon on the field of battle.

Announcement is made by Paul C. Jones, president, Dominion Rubber Company, Ltd., of the appointment of M. O. Simpson, formerly comptroller and treasurer, to the position of vice-president and treasurer. A. W. Bruce, formerly assistant comptroller, becomes comptroller.

R. W. Richards, general sales manager of the Goodyear Tire and Rubber Co. of Canada, Limited, has been elected president of the Aeronautical Institute of Canada, after having served as a director during the past year. His election occurred at the second annual Dominion conference, held in Toronto and attended by 360 delegates representing 99 Canadian communities. Objectives of the Aeronautical Institute include finding new sources of employment for members of the air force when they return to civil life and increasing greatly the number of airports and landing strips in Canada. A post-war program outlines a $2,000,000 construction job for creating four hundred additional landing fields or landing strips.

Directors of the Dunlop Tire and Rubber Goods Co., Ltd., have declared the regular semi-annual 2½ per cent on the 5 per cent cumulative redeemable first preferred, for the half year ending June 30, 1944, payable June 30, to shareholders of record June 15.

It is announced that C. E. Carson, general superintendent of the Sarnia, Ontario, refinery of Imperial Oil, Limited, for ten years, has been appointed general manager of refineries for the company. He succeeds George L. Stewart, recently elected vice-president in charge of manufacturing. J. Dean Bradley has been promoted to the post vacated by Mr. Carson.

Stock of scrap rubber held by the government-owned Fairmount Company is considered sufficient for from 18 months to two years, the Department of Munitions and Supply reported. The company stopped purchasing scrap rubber February 15 last.

Butac—New Type Softener

For some applications the retarding effect of Turgum, the refined pine gum softener developed by J. M. Huber, Inc., New York City, has been a disadvantage and to overcome this the company has developed a modified Turgum-type softener with activating properties. Called "Butac," the new material is a solid, having a softening point (ball and ring) of 145 to 150°F. It shatters readily at room temperature and may be added directly to the batch without previous melting. Butac, which has a specific gravity of 1.075 to 1.085, has a mild activating effect on the thiazole group of accelerators. When used in amounts of 5 to 15 parts on 100 GR-S it is said to produce superior vulcanizates, characterized by unusually flat modulus, tensile and elongation curves, good resistance to tear and to cut growth, both before and after heat aging. A technical bulletin on Butac has been made available by the company.

Forms Molded Goods Committee

The Rubber Manufacturers Association has created a Molded and Extruded Rubber Goods Committee, the need for which has long existed. W. Miller Cook, a vice-president of the Ohio Rubber Co., Willoughby, Ohio, has been elected chairman of the new committee. Mr. Cook has had twenty-five years of service in the rubber field and has long been associated with the rubber manufacturers group. The new committee is said to represent 119 rubber manufacturers who produce more than 90% of all the rubber products, other than tires and tubes, made in the United States. It will act as an advisory group to WPB and among other things will recommend which items the industry should be permitted to manufacture under wartime restrictions to meet civilian requirements.

LOS ANGELES NEWS

Plans for the construction of a new control and development laboratory, incorporating the latest scientific methods of testing and analyzing materials, at the Los Angeles plant, was announced by U. S. Rubber Co. on May 15.

The new laboratory will cost approximately $20,000 and will be located in a central position in the present factory building. Analytical and testing units formerly scattered throughout the plant will be integrated into one enlarged department. Additions of new equipment will nearly double facilities. A specially designed fabric testing room will be equipped to control temperature and humidity automatically, enabling the chemists to establish any desired atmospheric condition. The entire department will be air-conditioned and air-controlled.

New equipment to be added includes vulcanizing presses, testing mills, aging ovens, oxygen aging bombs, textile and rubber testing machines, analytical balances, and other scientific devices. Two presses have already been installed. It is expected that the new laboratory will be completed sometime in August.

Staff personnel which now includes 128 chemists, development engineers and specialists, will be augmented in proportion to the increased facilities and floor space.

J. M. Robbins, who has been chief chemist for Goodrich for some time, is being transferred to Bogota, Colombia, South America, where he will open a tire manufacturing branch. He was scheduled to go to Akron and to fly from there to Bogota.

W. R. Hucks, at one time president of the Los Angeles Rubber Group and formerly chief chemist for Goodrich in the Los Angeles plant, with the operating division of the Rubber Reserve Company since 1942, has been named production manager of all government synthetic rubber plants. Hucks was manager of the raw materials division of the Goodrich company immediately before accepting the government assignment. He entered the rubber industry in 1926 as a compounder for Goodrich and was transferred to Los Angeles in 1928. He is a graduate of Georgia Tech.

Bill Shawger, now connected with the Rubbercraft Corporation of California, Inc., was married May 5 to Christine Hoekstra.

Charles Roese, of Goodyear, accompanied by W. R. Bell, manager of the technical service department of that company, recently completed a three weeks business tour which took him to various points throughout the western states.

Ray Sexton, catering manager for the Mayfair Hotel, who has been host to the Los Angeles Rubber Group for several years, and who now knows all of the boys by their first names, reports that his stepson, Lieutenant Richard E. Gray, recently won the oak leaf cluster in recognition of bravery and service in the Army Air Corps in the South Pacific. Another stepson, Lieutenant William Gray, is also in the Army Air Corps, while a third one, Lieutenant Bert Gray, is in the Navy Air Corps. Mr. Sexton himself served in the First World War.

A. R. Baldwin, formerly district representative for A. Schrader's Son, has been transferred to Brooklyn where he will serve as assistant accessories sales manager. His place on the West Coast has been taken by C. M. Huffman, formerly inter-mountain representative for the company with headquarters at Denver.

A visitor with the Los Angeles Rubber Group at its June meeting was Major L. L. Washburn of the U. S. Army Signal Corps, formerly of the Army and Navy Electronic Products Agency.

Dick Banta, formerly employed by the Golden State Rubber Mills, has made a connection with the Armstrong Tire & Rubber Co. at Natchez, Mississippi.

H. E. Bash and W. E. Alexander, who have for some time been connected with the Caram Manufacturing Company, have formed a partnership and under the company name of the Maskite Company, 6005 South Gramercy Place, Los Angeles, will manufacture shoe cements and cements for masking tapes.

Geldard Heads Committee

Walter Geldard, of the Naugatuck Chemical Division of U. S. Rubber Co., has been named chairman of the committee which will be in charge of general arrangements for the Fall Meeting of the Rubber Division, which will be held on September 13, 14 and 15, with headquarters again at the Commodore Hotel in New York City. Those planning to attend the meeting are urged to make hotel reservations as early as possible. Abstracts of planned papers, consisting of 200 to 250 words, should be submitted in triplicate before July 1 to the secretary of the Division, H. I. Cramer, c/o Sharples Chemicals, Inc., 123 So. Broad St., Philadelphia, Penna. Complete manuscripts, which must be cleared by the Office of the Rubber Director, must be submitted in triplicate by August 1.

Representatives of the B. F. Goodrich Co. recently witnessed the terrific strain placed upon all types of Navy equipment as wave after wave of Army assault troops in water buffalos and other types of landing craft "invaded" a beach near Coronado, California, which was "defended" by Marines. Among the group invited to observe the "attack" were the three Goodrich executives pictured above, left to right: G. L. Matthias, superintendent of the mechanical division; L. L. Horchitz, California district manager of the industrial sales division; and Donald Fairbairn, California district manager of the automotive and aeronautical division.

OBITUARIES

Louis P. Gould

Louis P. Gould, supervisor of synthetic rubber compounding at the Inland Manufacturing Division of the General Motors Corp., Dayton, Ohio, and chairman of Sub-Committee XXII on Sponge Rubber of Committee D-11 on Rubber Products of the American Society for Testing Materials, died in Miami Valley Hospital, Dayton, late last month, as a result of complications following an operation on his spine.

Graduating magna cum laude from the University of Kentucky in 1922, Mr. Gould was associated with the rubber industry all during his adult life, having been associated with the Miller Rubber Co., at Akron, for 18 years, and with Inland Manufacturing for the past four years. He was a recognized authority on sponge rubber, and only a few months ago presented a paper on "Cellular Rubbers" at an A.S.T.M.-sponsored symposium at Cincinnati. This paper was published in the March and April, 1944, issues of RUBBER AGE.

Mr. Gould was a member of both the Rubber Division, A.C.S., and the parent society. He was also a member of the Pi Kappa Alpha Social Fraternity and the Akron Masonic Adoniram Lodge No. 517. He was a registered professional engineer. A widow, son and daughter survive.

F. William Ehlers

F. William Ehlers, vice-president and secretary of the Atlantic Rubber Manufacturing Corp., which maintains headquarters in New York City and factory in College Point, L. I., died on May 22 of a heart attack suffered as he was entering his home in East Orange, N. J. Born in Germany, Mr. Ehlers lived in England and in France before coming to the United States about 50 years ago. He joined the Atlantic rubber concern shortly after arriving in this country. A widow, a son, now in the Army Air Force, and two daughters survive.

A. A. Shifty

A. A. Shifty, comptroller of the Lake Shore Tire & Rubber Co., Des Moines, Iowa, died suddenly on May 17 in Des Moines. He was 39 years of age. Born in Fairview, N. J., on February 19, 1905, Mr. Shifty attended Cliffside Park High School and New York University. Funeral services were held on May 22 in Grantwood, N. J. A widow and daughter survive.

Harry J. Kapler

Harry John Kapler, well-known rubber executive, who was associated with Goodyear Rubber Sundries, Inc., for the past few years, died in St. Raphaels Hospital in New Haven, Conn., on May 26, following a long illness. He was 57 years of age. Born on August 23, 1887, in Cleveland, Mr. Kapler was graduated from the Case School of Applied Science where he majored in mechanical engineering. Shortly after being graduated, he joined the sales department of the former Mechanical Rubber Co. at Cleveland, and later served as vice-president for the Aetna Rubber Co., Cleveland, and the Vulcanized Rubber Co., Morrisville, Penna. Mr. Kapler was a Mason and his hobbies included the breeding of flowers and the collection of stamps. Cremation was held at Springfield, Mass. A widow and two sons, both in service, survive.

Charles A. Polson

Charles A. Polson, one of the founders of the Polson Rubber Co., manufacturers of inner tubes of Garrettsville, Ohio, died at his home in Long Beach, Calif., on May 10, following a long illness. He was 75 years of age. Mr. Polson was born near Munfordville, Kentucky, and with his brother, H. B. Polson, founded the Polson Rubber Co. in Kansas City, Mo., in 1909. He was active with the company as vice-president until his retirement from business in 1924. He continued as a director of the company until the time of his death. Mr. Polson was preceded in death by his only son, Paul A. Polson, who was vice-president of the inner tube firm at the time of his death last year. One daughter survives.

George C. Koch

George C. Koch, secretary-treasurer and general manager and one of the founders of the Mechanical Mold & Machine Co., Akron, died at the age of 57 at City Hospital on May 27 after a three-week illness. Born in Akron, Mr. Koch was a life-long resident of that city. He was active in the affairs of the Zion Lutheran Church where he was a trustee and had served for many years as treasurer. He was also a director of the South Akron Savings & Loan Co. Along with three associates, Mr. Koch founded the Mechanical Mold & Machine Co. in 1913. A widow survives.

New Monostearate Now Available

The immediate availability of "Bemul," a pure white, edible glyceryl monostearate in bead form which is completely dispersible in hot water and completely soluble in alcohols and hydrocarbons, has been announced by the Beacon Co., 97 Bickford St., Boston, Mass. The new material has a pH (3% aqueous dispersion at 25° C.) of 9.3 to 9.7, melts at 58° to 59° C. (capillary tube), and is nontoxic and practically odorless. Bemul has numerous practical uses, and may be used as an emulsifying agent in the polymerization of synthetic rubber and for preventing tack between rubber sheets.

Organize Raycord, Inc.

The organization of Raycord, Inc., at Spartanburg, S. C., for the purpose of producing rayon tire cord fabric was recently announced. An 81 foot extension has been made to the property formerly known as the Bobo Weaving Mill in Spartanburg and equipment amounting to $480,000, financed by the Defense Plants Corp., is now being installed. Raycord, Inc., is capitalized at $140,000, and its officers include V. M. Montgomery, president and treasurer; T. G. Roche, manager; and Margaret Lesesne, secretary and assistant treasurer.

Rubber Union Buys Building

The United Rubber Workers of America, CIO-affiliate, has purchased the Buckeye Building in the center of Akron, Ohio. The purchase price was reported to be $55,000, the down payment being $25,000 and the balance to be paid in semi-annual installments of $5,000 or more at 4% interest. The two top floors of the building will be used exclusively by the International Office of the union, while three lower floors and store space will continue to be rented out.

Pharis Leases New Plant

The leasing of a large factory location at Parkersburg, West Virginia, for the expanded production of fuel cells and pneumatic lifting bags, has been announced by the Pharis Tire & Rubber Co., Newark, Ohio. M. R. Bell, chief aeronautical engineer of the company, has been named manager of the Parkersburg plant, while R. D. Parr has been named production superintendent of the Newark division.

Additional "E" Awards

Included among those receiving the Army-Navy "E" award in recent weeks for production efficiency were the Okonite Co., Passaic, N. J., and Sports Products, Inc., Cincinnati, Ohio. For the fifth time, the Navy "E" was renewed at the three plants of the Farrel-Birmingham Co., Inc.

NEW EQUIPMENT

Electronic Heating of Rayon Tire Cord

All rayon tire cord manufactured by the Industrial Rayon Corp., Cleveland, Ohio, is subjected to electronic heating in a new process invented by the company's technical staff to solve age-old problems in the twist-setting of textile yarns.

The twist of the rayon tire cord is set by placing packages of the cord in a high frequency electrical field. Heat generated in the cord by this operation is distributed so uniformly that cones containing 18 pounds or more of rayon tire cord may be effectively treated.

Such giant cones are used in the weftless method of tire construction.

The process is completed in a matter of minutes and results in the production of a cord in which the twist is uniformly set. Control of the moisture content of the cord may be facilitated by wrapping the cones of cord in moistureproof paper and processing them in this form.

The equipment originally installed for this process has been in operation at Industrial Rayon's Cleveland plant for more than eight months and includes high frequency power generating units having outputs of approximately 22,500 BTU per hour each. They were furnished by the Girdler Corporation, through its Thermex Division, and each unit is capable of handling several thousand pounds of packaged tire cord in a 24 hour period.

Additional high frequency twist-setting units are to be installed by Industrial Rayon to care for the expanded capacity of its Cleveland plant and the new tire cord department of its Painesville plant, both of which are scheduled to enter production in the third quarter of this year.

Patent applications covering the use of high frequency heating for twist-setting of textile products generally, including tire cord, have been assigned to Industrial Rayon. The new process is also being used by the B. F. Goodrich Company, under license from Industrial Rayon, in connection with production of rayon tire cord. Radio Corporation of America supplied the high frequency power units used by B. F. Goodrich.

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A LONG ESTABLISHED AND PROVEN PRODUCT

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1903
SPRINGFIELD, NEW JERSEY

Improved Dillon Tensile Tester

Several improvements have been incorporated in a new model of the Dillon Tensile Tester featured by W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill.

Features of the new model include interchangeable dynamometers which make possible seven different

loading ranges, each dynamometer being equipped with maximum indicator hand and shatterproof crystal; double-sealed ball bearings at four points of dynamometer suspension to assure true, frictionless loading; quickly interchangeable gripping jaws, with jaws for flat specimens furnished as standard, unless a specific diameter is specified, and special jaws being made to order; and a counterbalanced handwheel which makes for ease of operation.

The upright pressure columns of the new model are of high grade steel, 1¼-inch in diameter, while the tester head is made of specially constructed Meehanite casting. The base is heavy gauge sheet steel welded throughout for greatest possible rigidity. Rapid reset is achieved by removing the steel keyway pins from each side of the acme drive screw at the keyway block. Pins are notched at top ends to facilitate removal.

For compression testing, the manufacturers offer the Dillon Compression Cage, while for transverse testing, a special Transverse Testing Fixture is obtainable.

New Line of Cochrane Rotameters

Several important features, claimed to be exclusive, are listed by the Cochrane Corporation, 17th Street and Allegheny Avenue, Philadelphia 32, Penna., in announcing a new line of rotameters. Called the Series R-100 Rotameters, the meters are of the indicating area meter type, covering sizes from ⅛th to 3 inches, with both free and guided floats. The floats may be viscosity or density compensated.

Features of the new rotameters are listed by the manufacturers as follows: (1) Spring Stop Floats, to prevent damage to float by sudden surges of liquid;

(2) High pressure stuffing boxes, permitting use of corrosive liquids under high operating pressures; (3) Single external adjustment of stuffing boxes by wrench, instead of taking up successively a number of bolts or screws; (4) White-backed metering tube for easy reading; (5) Interchangeable calibration scales for quick and inexpensive change from one service to another; (6) Constant tension guide rod is anchored in ends of glass tube instead of in end fittings. It can therefore be more accurately centered and its tension will be unchanged by repeated stuffing box adjustment; (7) For test accuracy work, guide rod can be supplied with spring loading feature to secure ideal precision of alignment.

Francis Hydraulic Presses

A new line of general purpose hydraulic presses, available in four sizes, and suitable for rubber, plastics, compreg, wood and other production work, as well as being suited for laboratory work, was recently introduced by the Charles E. Francis Co., Rushville, Indiana. The four sizes available are 12 x 12, 18 x 18, 24 x 24, and 30 x 30 inches, all with or without hot plates.

The 12 x 12-inch press, which like all of the models may be fitted with electrically-heated or steam-heated plates with any type connections, has 50 tons pressure capacity and 8-inch ram with 8-inch stroke. For comparison, the 30 x 30-inch press, though stroke, daylight opening and tonnage pressure may vary, has a 14-inch ram with 14-inch stroke, and applies 153 tons of pressure at 2,000 pounds fluid or gauge pressure.

Among features that are said to make these Francis general purpose presses adaptable to a multitude of tasks are the number of hot plates, long stroke, choice of methods for heating, and choice of power units. If hand pumping units are preferred, they can be furnished in single or double type, the latter type having

one pump with a 2-inch piston for quick closing and the other a ⅝-inch piston for final pressures.

Motorized pumping units can be secured in a variety of arrangements and to suit practically any requirements as to speed, pressure and control. Floor space occupied by the presses runs from 18 x 24 inches for the smallest to 34 x 37 inches for the largest model.

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The *Original* Neoprene Type

A supreme quality product for the rubber trade. Extremely fine state of subdivision. A curing agent unexcelled for increased modulus, greater resilience, reduced heat build-up, lower compression set and retention of tensile strength during heat service.

LIGHT

A high quality product of greater density than "Extra Light," but high in MgO and low in impurities. An excellent value for many uses.

MEDIUM

A good value. Very active. High Magnesia content, low in impurities. Medium density.

HEAVY

All types can be furnished. Specially ground to meet the exacting Code Pigment Specifications of the Rubber Trade. Unground types for chemical uses.

PACKAGES—Specially designed to protect contents from moisture and air. Corrugated carton with special waterproof liner, and inner paper liner. Five-ply multi-wall bag, including asphalt liner.

Special Service for All Requirements of the Rubber Trade

WAREHOUSE STOCKS—Maintained at Philadelphia, New York, Chicago and Akron.

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PLASTICS

THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of handmiking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*

Ask for our bulletin on the Schuster Magnetic Gauge.

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BLACK ROCK MANUFACTURING CO. Bridgeport, Conn.

Designed to handle metal parts which must be rotated while they are passing through the cleaning chamber for highest cleaning efficiency, the **Monorail-Spray Washer** has been developed by the American Foundry Equipment Co., Mishawaka, Indiana. Accessibility of all working parts is an important feature of the new design.

Packless Metal Products Corp., New Rochelle, N. Y., has developed a **detachable brass coupling** for helical flexible metal hose in sizes from ¾s to 1½ inches I.D. The coupling is said to offer the advantage of being mechanically self-sealing.

Coleman Certified Buffer Tablets are now offered as a comprehensive line of exactly compounded solid buffers, covering the region 2.0 to 12.0 pH in steps of 0.20 pH, by the Burrell Technical Supply Co., Pittsburgh 19, Penna. From the 50 different formulas, it is possible to select the exact pH value demanded, with assurance that the resulting buffer will be correct to within 0.02 pH.

Specifications for Scrap Rubber

(Continued from page 270)

5. Solid Tires. This grade shall consist of solid motor truck tires over two and one-half inches in width free from oxidized tires, industrial truck tires, metal, hard bases, fibre bases, and cloth bases.

6. Bicycle Tires. This grade shall be free from hard and oxidized tires, wire and beaded tires, and shall be free from metal valves.

7. Shoes. Shoes shall consist of rubber boots and shoes of United States or Canadian manufacture free from foreign material and leather and any composite non-rubber material.

(a) *Black Shoes.* This grade may contain in addition to strictly black boots and shoes other varieties as white or colored shoes, colored soles, heels and soles from which the uppers have been removed, arctics, and tennis shoes, subject to purchase agreement as to sorting and as to price differentials covering the specific varieties present in the shipment.

(b) *Arctics.* This grade includes cloth top shoes and gaiters and light all-rubber gaiters. If the purchase contract specifies trimmed arctics the material shall be free from metal. If the purchase contract specifies strictly black arctics the material shall be free from white or colored shoes and light all-rubber gaiters.

(c) *Tennis Shoes.* This grade shall be free from leather or composition soles.

8. Hose. Hose shall be free from metal, rags, rope, hard or oxidized hose and cotton covered hose.

(a) *Airbrake Hose.* This grade shall be strictly airbrake hose free from steam or any other kind of hose.

(b) *Garden Hose.* This grade shall be strictly garden hose except that non-oxidized steam hose may be included. All-rubber hose containing no fabric insertion is not acceptable.

9. Special Classifications. Scrap Rubber of a character not described by the specifications for standard grades is a special grade subject to specification by the Buyer. Such scrap shall be clean, free from cloth, metal and other foreign material, and from crusty, hard, or oxidized material. It shall be equal in all respects to the sample submitted.

REVIEWS

BOOKS

Plastic Horizons. By B. H. Weil and Victor J. Anhorn. Published by the Jacques Cattell Press, Lancaster, Penna. 5½ x 7½ in. 169 pp. $2.50.

This is an interesting book on the development, current use and probable application of plastics in the future. It is a comprehensive, general book, sufficiently non-technical for the general public, yet detailed enough to be informative. Without emphasizing details of chemistry, the authors, both associated with the Gulf Research and Development Co., have pointed out scientific relationships and have blended science with economics in an interesting manner. The development of plastics is stressed throughout the book.

The authors have not overlooked synthetic rubbers and it is evident from the 12 pages devoted to this subject that they have carefully diagnosed the past, present and possible future of these rubbers. As in the case of the direct plastics, the history of the various synthetic rubbers—Buna S, Buna N, neoprene, Thiokol, Butyl—is reviewed with specific properties and applications stressed. Some mention is also made of numerous rubber-like materials, including Koroseal, the vinyls, Vistanex, ethyl rubber, Agripol and Kempol. The section devoted to synthetic rubbers may aptly be termed a concise review of the current situation.

The book consists of five chapters in all, as follows: (1) What Are Plastics; (2) Plastics and Our Modern World; (3) Plastics in a World at War; (4) Synthetic Fibers and Synthetic Rubbers; (5) Plastics and the Future. Each chapter is broken down into numerous sub-sections. In addition, the book contains a section devoted to names, chemical types, and manufacturers of familiar plastics and related materials. Asterisks are employed to indicate the specific uses of many of the plastics listed. A cross-referenced subject index is also included.

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Soybean Chemistry and Technology. By Klare S. Markley and Warren H. Goss. Published by the Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 5½ x 8½ in. 261 pp. $3.50.

This is a timely book which meets the growing demand for up-to-date facts covering the chemical and technical aspects of the versatile oriental soybean. Although it is largely based on the experiments of the authors, both associated with the Department of Agriculture and both formerly connected with the U. S. Regional Soybean Industrial Products Laboratory, it also comprises a summary of numerous research contributions and references that have appeared up to 1943 in both American and European literature.

The machinery and equipment of soybean processing industries is described and illustrated in detail, while a comprehensive list of soybean oil mills and manufacturers of equipment is included. The use of soybeans, soybean oil and their derivatives has extended to a great many fields, and applications as animal feed, human food, lubricants, as well as uses in paints, printing inks, sizings, rubber substitutes and waterproofing, are discussed.

The book is divided into two parts, the first devoted to the "Chemical Composition of the Soybean and Properties of Constituents and Derived Products," and the second to "Processing of Soybeans and Soybean Products." Extensive literature references are given at the end of each section. A subject index is included.

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Principles of Powder Metallurgy. By Franz Skaupy. Translated by Marion Lee Taylor. Published by the Philosophical Library, 15 East 40th St., New York, N. Y. 6 x 9 in. 80 pp. $3.00.

Most metal objects pass through a fusion or melting process. In recent years, a relatively new method of producing such objects by changing metal powder into compact metal bodies by a process of "caking" or "cohesion" has received some attention. More recently, this method has been importantly applied in the production of particularly hard cutting metal. This book, translated from the German, is a short review of the new field to which the author applies the name "metal ceramics," a field which he predicts will form an important part and province of metallurgy. The book has an introduction, a general part and a special part. It includes an appendix, devoted to recent developments, but lacks an index.

BOOKLETS, CATALOGS, Etc.

Measuring the Rate of Wear of Tire Treads. By Frank L. Roth and William L. Holt. National Bureau of Standards, Washington, D. C. 6 x 9 in. 6 pp. (Available from Superintendent of Documents, Washington, D. C., at 5c per copy.)

Typical results obtained in a series of special tests on five different tire tread materials, including prewar natural rubber treads, are given in this report. The rates of wear of the different tread materials were determined by weighing tires after running them prescribed distances on the roads. The method proved feasible for passenger car tires, involved a minimum amount of work, and yielded data in a few miles of driving which could be used to predict the life of the tread. It is interesting to note that the rate of wear of the least resistant tread material was eight times that of the most resistant material. The report is a reprint from the February, 1944, issue of the *Journal of Research*, official organ of the National Bureau of Standards.

•

How to Make Patterns and Models with Gypsum Cement. Industrial Division, U. S. Gypsum Co., 300 West Adams St., Chicago 6, Ill. 8½ x 11 in. 48 pp.

This is an excellent manual, well written and liberally and clearly illustrated, covering the production of patterns and models with Gypsum cement. This cement is made from a natural mineral—gypsum rock either white or grey—which is finely ground and properly calcined to obtain a uniform product. Experience has indicated that complex contours and intersections can be accurately and quickly developed with this type of cement. Recommended methods of making patterns and models wtih the cement, including equipment required and steps to follow, are given in the manual. The advantages and benefits of patterns and models made of gypsum cements are outlined.

•

Compounding Manual for Chemigum N-1. Goodyear Tire & Rubber Co., Akron 16, Ohio. 9 x 11½ in. 16 pp.

As indicated by the title, this is a compounding manual for Chemigum N-1, the oil-resistant type of synthetic rubber developed by Goodyear. It covers general properties of the material, compounding suggestions, antioxidants, milling, calendering and fabrication, and typical compounds, the latter including low quality, quality molding, hard packing and extrusion compounds. The manufacture of Chemigum N-1 is also discussed. Other sections in the manual are devoted to important dates in the development of synthetic rubber and the story of Goodyear and synthetic rubber.

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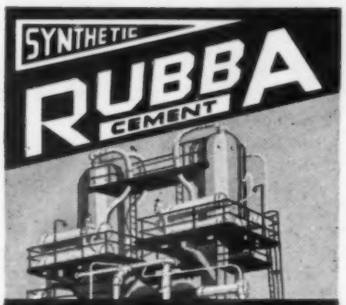

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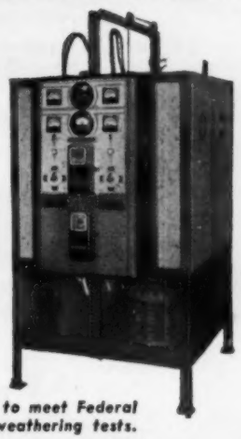

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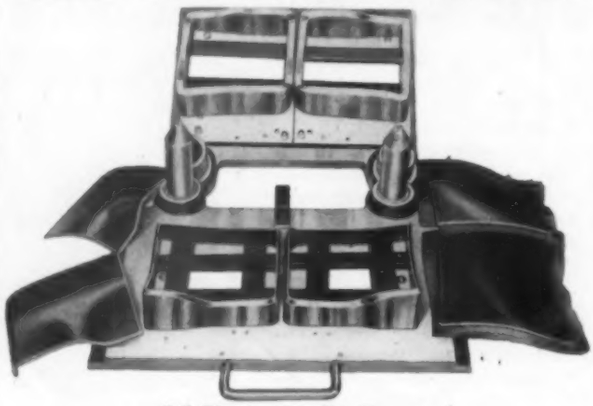

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REVIEWS (CONT'D)

Stress-Strain Data for Vulcanized Rubber under Various Types of Deformation. (Publication No. 44.) By L. R. G. Treloar. British Rubber Producers' Research Association, 19 Fenchurch St., London, E. C. 3, England. 6¼ x 9¾ in. 12 pp.

This work, part of the program of fundamental research on rubber undertaken by the B.R.P.R.A., gives stress-strain data for two types of vulcanized rubber under deformation. The two types studied were an 8% S rubber (the formula for which is given) and a latex rubber. Types of deformation studied included simple elongation, 2-dimensional extension (or compression), pure shear, and combined elongation and shear. It is concluded that the theory provided by the work done provides a satisfactory explanation of rubber-like elasticity and forms a useful basis for the description of the mechanical properties of rubber subjected to large deformations of any type.

•

The Problem of the Elasticity of Rubber and of Rubber-Like Materials. By Eugene Guth. Department of Physics, University of Notre Dame, Notre Dame, Ind. 7½ x 10¼ in. 25 pp.

Reprinted from Publication No. 21 of the American Association for the Advancement of Science, this report is restricted to the problem of the elasticity of rubber and its solution by some of the new experimental and theoretical investigations. A short discussion of inorganic, organic and biologic rubber-like materials reveals the general occurrence of rubber-like elasticity. Surface films of some high polymeric substances exhibit reversible elasticity and have a network structure closely resembling that of rubber. In short, this work represents a quantitative solution of the problem of the elasticity of rubber and of rubber-like materials.

•

Wear. By D. Landau. Nitralloy Corp., 230 Park Ave., New York, N. Y. 6 x 9 in. 46 pp.

Sub-titled "A Discussion of the Mechanism of Wear Phenomena and Influencing Factors," this is believed to be the first booklet in English published on the subject of wear. It treats with such angles as the mechanism of wear, wear and physical properties, molecular adhesion, surface melting, specific pressures, lubricants and wear, scoring, fretting, gear pitting, work hardening, chemical effects and surface finish and wear. The wear of Nitralloy versus other steels is also discussed. A comprehensive bibliography on the general subject of wear is included.

•

Rio Resin in GR-M Ignition Cable Jacket Compound. (Booklet No. 3A.) R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 4 pp.

As indicated by the title, this laboratory bulletin covers the results attained by incorporating Rio Resin in a GR-M (neoprene) ignition cable jacket compound. Test results, including stress, tensile and elongation, are given, and volume costs are indicated. The results indicate that incorporation of Rio Resin in such compounds lowers modulus and increases elongation without affecting tensile strength. The rate of cure is increased slightly.

•

Dow and Magnesium. Dow Chemical Co., Midland, Mich. 6 x 9 in. 76 pp.

This booklet comprises the statement filed by Willard H. Dow, president and general manager of the Dow Chemical Co., with the Truman Committee at Washington on March 6, 1944, together with extracts from the oral statement made by Dr. Dow, an extract from the cross-examination, and extracts from the report of the Committee. It also represents a complete history of the magnesium industry and the role played by the Dow company in the development of that history.

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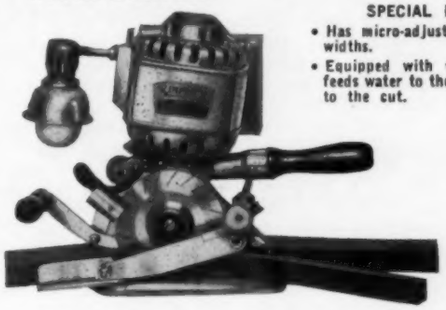

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JUNE 12, 1944

Crude Rubber

OF special importance to the future of the crude and synthetic rubber industries in the postwar period was the expected announcement in the past few days by the State Department that a combined industry-government advisory panel has been appointed to counsel with that department on the over-all rubber problem. One of the first problems that this panel will face is whether or not the United States should join with the British and others in the formulation of a new international organization somewhat along the lines of the former International Rubber Regulation Committee, the liquidation of which recently occurred.

The guayule rubber program, marked for liquidation by an economy-minded House committee, received a new lease on life on May 16 when the Senate Appropriations Committee, after hearing several hours of testimony, recommended that $5,420,000 be appropriated to continue the program. Proponents of the program argued that liquidation of the project as this stage would virtually mean throwing away the $35,196,245 invested in it to date and would possibly bar the Southwest from a profitable postwar industry. Rubber Director Dewey has termed the project "an insurance program."

The proposed new agreement between the Rubber Development Corporation and Shada, the rubber agency of Haiti, mentioned last month, contemplates turning leased land back to the peasant owners as rapidly as possible, with the exception of the Gonaives Experiment Station and some other experimental areas, which Shada will continue to operate in behalf of the American agency. All planting work on cryptostegia has been completed by the Haitian organization.

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21¾	38½
Thin Brown Crepe, 1X	21¾	38½
Thick Remilled Blankets, #1	21¾	38¾
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21¾	38¾
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12¾	26½
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11¾	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¾	23¾
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

The turnover in scrap rubber continues fair, and even though collections are somewhat limited by the labor factor, tonnage is moving at a fairly brisk rate. It was recently learned that the Rubber Reserve Co. is requesting bids on an "as is, where is" basis of various scrap rubber piles still stocked in various parts of the country, including the 3,000 tons of miscellaneous scrap stored in Warren, Ohio. For the most part, this scrap consists of garden hose, hot water bottles, toys, stair treads, etc. Of direct importance to the entire scrap trade, including rubber manufacturers selling trimmings and the like, are the new specifications for scrap rubber established by the Rubber Reclaimers Association, reproduced in full elsewhere in this issue. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

The price of middling uplands on the Cotton Exchange has moved in a 64 point range, considerably active when compared with recent movements, since our last report. High for the month was 22.25 today (June 12) and low was 21.61 on May 22. The average price for middling uplands for the month of May was 21.63, based on 26 trading days. Prices tended to dip downward in mid-May, due largely to market hesitancy attributed to Washington developments. The trade awaited reaction to the Bankhead proposal to tie textile ceilings to the market price of raw cotton. Indications that approval might be given to this proposal, plus renewed mill buying, some of it believed for the account of tire companies, led to a reversal of the price trend, which has been decidedly upward in the past ten days. News of the successful invasion of France by the Allies has surprisingly little effect on the market. According to a survey made by the *Journal of Commerce,* cotton plantings in the United States are the smallest this season in 52 years, with a total of 20,151,000 acres planted. Quotations for middling uplands on the Exchange (new contract) follow:

	May 15	June 15		
	Close	High	Low	Close
October	19.85	20.64	20.56	20.61
December	19.60	20.39	20.31	20.34
March	....	20.15	20.05	20.09

Reclaimed Rubber

A slight slackening of demand for reclaim has been noted in recent weeks, attributed largely to the camelback field, in which manufacturers are now permitted to use GR-S. Demand from other branches of the industry however, particularly from heel and sole manufacturers, continues at the same high level reported for recent months. In fact, because of the pressure being exerted on heel and sole manufacturers to increase their production to the point where combined output will double that of last year, still further demands for reclaim are anticipated. Mid-West Rubber Reclaiming Co., one of the larger producers of reclaim, has announced the completion of a new research laboratory at its East St. Louis, Ill., plant. Formal dedication of the laboratory is to take place shortly.

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb.	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¾

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¾
Double filling, A grade	lb.	—	@	.20¾

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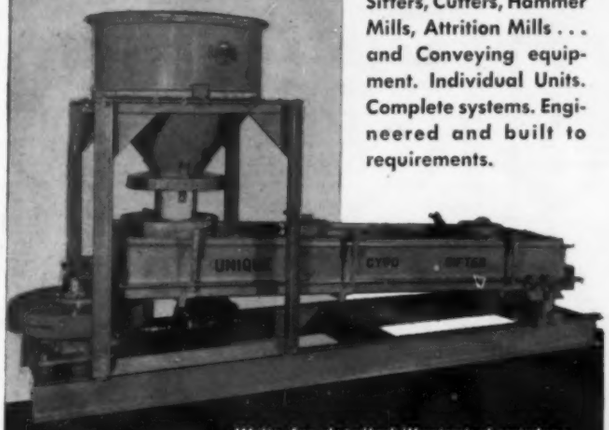

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Organic			
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A-10	lb.	.36	.42
A-19	lb.	.52	.65
A-32	lb.	.60	.70
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Aldehyde ammonia, crystals	lb.	.65	.70
Altax	lb.	.43	.45
Beutene	lb.	.59	.64
B-J-F	lb.	.38	.43
Butasan	lb.	—	1.13
Butyl Zimate	lb.	—	1.13
Captax	lb.	.38	.40
Cryiene	lb.	.40	.47
Di-Ortho-Tolyguanidine	lb.	.44	.46
Diphenylguanidine	lb.	.35	.36
El-Sixty	lb.	.40	.47
Ethasan	lb.	—	1.13
Ethyl Zimete	lb.	—	1.13
Ethylidine aniline	lb.	.42	.43
Formaldehyde aniline	lb.	.31	—
Guantal	lb.	.39	.48
Hepteen	lb.	.34	.39
Hexamethylenetetramine	lb.	.33	—
Lead Oleate, No. 999	lb.	.13	—
Witco	lb.	.15	—
Ledate	lb.	—	1.48
Methasan	lb.	—	1.23
Methyl Tuads	lb.	—	1.53
Methyl Zimate	lb.	—	1.23
Monex	lb.	—	1.53
Pentex	lb.	.74	.84
Phenex	lb.	.49	.54
Pip-Pip	lb.	—	1.63
R & H 50-D	lb.	.42	.43
R-2 Crystals	lb.	—	1.55
Rotax	lb.	.48	.50
Safex	lb.	1.15	1.25
Santocure	lb.	.60	.67
Selenac	lb.	—	1.98
SPDX-G	lb.	.53	.58
Super-Sulfur No. 2	lb.	.13	.15
Thiocarbanilid, drums	lb.	.28	.33
Thiofide	lb.	.43	.50
Thiotax	lb.	.38	.45
Thiurad	lb.	—	1.53
Trimene	lb.	.54	.64
base	lb.	1.03	1.18
Triphenylguanidine	lb.	.45	—
Ulto	lb.	.99	1.04
Ureka	lb.	.50	.57
Blend B	lb.	.50	.57
Blend C	lb.	.48	.55
Vulcanex	lb.	.42	.43
Vulcanol	lb.	.85	—
Inorganic			
Litharge, domestic	lb.	.07	.07½
Magnesia, calcined, heavy	lb.	.04	—

COLORS

Blues [b]			
Prussian	lb.	.36	—
Ultramarine	lb.	.17	.27
Browns [b]			
Mapico	lb.	.1135	—
Umber, Turkey	lb.	.04¼	—
Greens [b]			
Chrome	lb.	—	.25
Guignet's Green	lb.	.70	—
Reds			
Antimony			
crimson, 15/17	lb.	—	—
sulfur, free	lb.	—	—
Indian	lb.	.08¾	—
Domestic (Maroon)	lb.	.11	—
Mapico	lb.	.096	—
Red oxide, pure	lb.	.10	.12
Rub-Er-Red	lb.	.09¾	—
Whites [b]			
Cryptone No. 19	lb.	.0560	.0585
Cryptone CB No. 21	lb.	.0560	.0585
Cryptone ZS-800	lb.	.0825	.0850
Lithopone:			
Albalith	lb.	.04¼	.04½
Astrolith	lb.	.04¼	.04½
Azolith	lb.	.04¼	.04½
Ray-cal	lb.	.05½	.05¾
Rayox	lb.	.14½	.15¾
Titanox A	lb.	.14½	.14¾
Titanox B	lb.	.05¾	.06
Titanox C	lb.	.05½	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼	.07½
Anaconda, lead free	lb.	.07¼	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼	.07½
XX Red—4	lb.	.07¼	.07½
XX Red—72	lb.	.07¼	.07½
XX Red—103	lb.	.07¼	.07½
Kadox, black label—15	lb.	.07¼	.07½
Red label—17	lb.	.07¼	.07½
St. Joe, black label	lb.	.07¼	.07½
green label	lb.	.07¼	.07½
red label	lb.	.07¼	.07½
U. S. P.—7, bbls.	lb.	.10½	.10¾

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½	.09¾
Green seal—8	lb.	.09	.09¼
Red seal—9	lb.	.08½	.08¾
Yellows [b]			
Cadmolith	lb.	.55	.60
Chrome	lb.	—	.50
Mapico	lb.	.071	—

BLACKS
(In bags, carload lots)

Arrow Compact		.0355	—
Atlantic		.0355	—
Certified		.0355	—
Certified Spheron		.0355	—
Channel "S"		.12	—
Continental		.0355	—
Disperso		.0355	—
Dixiedensed		.0355	—
Dixiedensed 66		.0355	—
Excello		.0355	—
Furnex		.03½	.06
Furnex Beads		.03½	.06
Gastex		.03½	.06
Kosmobile		.0355	—
Kosmobile 66		.0355	—
Kosmos-Dixie 20	lb.	.03½	.06
Micronex (Amarillo)		.0355	—
Micronex Beads (Amarillo)		.0355	—
Pelletex		.03½	.06
P-33		.0475	—
Philblack A	lb.	.05	—
Shell Carbon (Del. Midwest)		.0240	—
Sterling		.035	—
Supreme		.0355	—
Thermax		.0225	—
Thermax "S"		.0675	—
Wyex		.0355	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	24.50
99½%-300	ton	—	16.50
86-90%-300	ton	—	13.50
Asbestine	ton	16.50	20.00
Atomite	ton	—	27.50
Barium carbonate (98-100%)	ton	47.00	49.00
Barytes	ton	25.35	36.00
Bentonite	ton	11.00	16.00
Blanc fixe, dry	ton	60.00	67.50
Calcene	ton	37.50	43.00
Catalpo (fact)	lb.	.02	—
Chalk, precipitated			
Suprex white	ton	32.50	45.00
Clay, Aerfloted, Suprex	ton	11.00	22.50
Aerfloted Paragon	ton	10.00	22.50
Champion	ton	—	11.00
Crown	ton	—	11.00
Dixie	ton	—	11.00
Kaolloid	ton	—	9.00
Langford	ton	—	8.50
Magnolia	ton	—	10.00
McNamee	ton	—	10.00
Par	ton	—	11.00
Witco	ton	10.00	—
Kalite No. 1	ton	—	26.00
Kalite No. 3	ton	—	36.00
Kalvan	ton	—	100.00
Kalvan "S"	lb.	—	.09½
Keystone white	ton	—	14.00
Magnesium carbonate	lb.	.06¾	—
Mineralite	ton	—	30.00
Pyrax A	ton	—	7.90
Rottenstone (powd. Dom.)	ton	25.50	37.50
Rubberol	lb.	—	.17½
Silene EF (calcium silicate)	lb.	.055	.06
Snowflake white	ton	—	16.00
Talc, domestic	ton	17.00	25.00
Whiting, commercial	ton	16.00	26.00
Witco	ton	6.00	—
Witcal	ton	—	100.00
Witcarb R-12	ton	—	40.00
Wood Flour (100 mesh)	ton	30.00	32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00	—
Black Diamond	ton	25.00	—
Hard Hydrocarbon	ton	25.00	27.00
MilliMar	lb.	—	.05½

MISCELLANEOUS

Aromatics—Rodo $0	lb.	4.00	4.50
Rodo $10	lb.	5.00	5.50
Curodex 19	lb.	2.75	—
Curodex 188	lb.	3.50	—
Curodex 198	lb.	4.50	—
Para-Dors	lb.	4.50	—
Aresklene No. 375	lb.	.35	.50
Darvan (dispersing agent)	lb.	.30	.34
Santomerse S	lb.	.11	.25
Sponge Paste	lb.	—	.18
Sunproof	lb.	.22¾	.27¾
Tonox	lb.	.50	.59
Ty-Ply	gal.	6.75	8.00
Unicel (blowing agent)	lb.	.50	—

SOFTENERS

Acids			
Acetic, 28%, bbls.[a]	100 lb.	3.38	3.63
Nitric, 36 degrees	cwt.	5.00	—
Acids, Fatty			
Laurex	lb.	.14¾	.17¼
SL-20	lb.	.11	.13
Stearex Beads	lb.	.10	.11
Stearite	lb.	.10	—

Alkalies			
Caustic Soda, 76%	cwt.	2.70	5.70
Soda Ash, 58%	cwt.	1.15	2.93
Oils			
Degras, bbls.	lb.	.10	.12
Para-Flux	gal.	.17	.18
Para-Lube	lb.	.046	.048
Petrolatum, amber [b]	lb.	.03¼	—
Pigmentaroil, tank cars	gal.	.20½	—
in drums	gal.	.26½	.27½
Pine, tanks	gal.	.55	—
Rosin Oil, cmpd.	gal.	.40	—
Rubberol	lb.	.13½	.14
Rubtack	lb.	.10	—
Seedine, c.l.	lb.	.07¼	—
Witco Palm Oil	lb.	—	—
Witco Softener No. 20	gal.	.20	—
Woburn No. 8, c.l.	lb.	.06	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06	—
coal tar	ton	19.00	22.00
hardwood	ton	16.00	22.50
pine, 200 lb. gr. wt.	bbl.	—	4.50
Pigmentar, tank cars	gal.	.20½	—
in drums	gal.	.26½	.27½
Retort Pine Tar, drums	gal.	.26½	.27½
Solvents			
Acetone, pure [a]	lb.	.07	—
Benzene, 90%, tank car	gal.	.14	—
Beta-Trichlorethane	gal.	—	.20
Bondogen	lb.	.98	1.05
Carbon, bisulfide	lb.	05	.08½
Carbon tetrachloride	gal.	.83	1.27
Dichlorethylene	lb.	—	—
Dipentene, cml., drums	gal.	.48	.50
Ethylene dichloride	lb.	.07½	.08½
Plastogen	lb.	.07¾	.08
Reogen (drums)	lb.	.11½	.12
Rub-Sol	gal.	.09½	—
Trichlorethylene	lb.	.08	.09¼
Turpentine, spirits	lb.	.78½	—
dest. dist., drums	gal.	.50	.55
Waxes			
Beeswax, white [b]	lb.	.58	—
Carnauba, yellow [b]	lb.	.83¼	—
Ceresin, white, dom.	lb.	.13½	.15
Montan, crude	lb.	—	—
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼	—
Refined, 123/125	lb.	.05¾	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95	2.05
Gel	lb.	.52	.54
Hipar	lb.	.61	.63
Powder	lb.	.43	.45
Resin	lb.	.43	.45
Resin D	lb.	.43	.45
White	lb.	1.23	1.33
Albasan	lb.	.69	.74
Antox	lb.	.54	.56
B-L-E	lb.	.43	.52
Flectol H	lb.	.43	.55
Flectol White	lb.	.89	1.00
Neozone A, B, C, D, E	lb.	.43	.63
Oxynone	lb.	.77	.90
Retardex	lb.	.44½	.47½
Santoflex B	lb.	.43	.55
Santoflex BX	lb.	.54	.64
Santovar O	lb.	1.15	1.40
S.C.R.	lb.	.32	.34
Stabilite	lb.	.48	.50
Stabilite Alba	lb.	.69	.74
VGB	lb.	.43	.52

EXTENDERS

Naftolen R-100	lb.	.10	.12
Vanzak	gal.	.05	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35	.50
Cocoa Soapstock	lb.	.06	.08
Colite	gal.	.90	1.15
Dipex	lb.	.06	.08
Glycerized Liquid Lubricant	gal.	—	1.35
Lubrex	lb.	.25	.30
Mineralite	ton	—	30.00
Sericite	ton	65.00	75.00
Soap Tree Bark, cut, sifted	lb.	.06	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25	—
Amberex Type B	lb.	.18¾	—
Black	lb.	.08½	.13
White	lb.	.09	.15
Brown	lb.	.10	.14
Neophax A	lb.	.16½	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08	.12
Sulfur Chloride, yellow (drs.)	lb.	.03	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55	—
Commercial (bags)	cwt.	2.20	—
Telloy	lb.	1.75	—
Vandex	lb.	1.75	—

TESTING EQUIPMENT WHICH SETS STANDARDS

In a number of instances, tests designated as "standard" by Societies, laboratories, etc., are based on *Scott Testers. Rely on our 60 models for authoritative results on tensile, hysteresis, flexing, compression-cutting, plasticity, state-of-cure, adhesion, etc.

SCOTT TESTERS

* *Registered Trademark*

HENRY L. SCOTT CO. 85 Blackstone St. Providence, R. I.

Let us estimate on your

CUTTING DIES

● Years of experience making dies of all kinds for rubber manufacturers enable us to offer you correctly designed dies of tempered steel which retain their cutting edges....*Send blue print for quotation.*

BROCKTON CUTTING DIE & MACHINE CO. INC.
CUTTING AND PERFORATING DIES

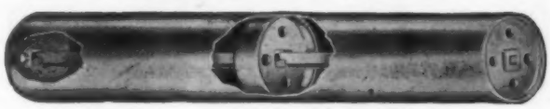
AVON, MASS.

New and Better

GAMMETER'S

ALL STEEL ALL WELDED

CALENDER STOCK SHELL



4" - 5" - 6" - 8" - 10" - 12" diameters, any length.

Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

Carey EST. 1873

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OXIDES AND CARBONATES—LIGHT AND HEAVY FOR TECHNICAL AND DRUG USES

THE PHILIP CAREY MFG. COMPANY
Cincinnati, Ohio

Branches in all principal cities

WM. S. GRAY & CO., *Distributors,* **New York City**

New Stock Cooling Rack

THIS New Rack offers a convenient method for storing materials that require cooling or air drying.

● Rack can be either stationary or mounted on casters.

● Trays have perforated metal surface and can be spaced to suit.

SPADONE MACHINE COMPANY
10 East 43rd St. New York 17, N. Y.

CONTINENTAL-MEXICAN RUBBER CO., Inc.
745 Fifth Ave., New York City

Producer in Mexico of

GUAYULE RUBBER

Washed — AMPAR BRAND — Dried

Formerly Distributed By
CONTINENTAL RUBBER COMPANY OF NEW YORK
An Affiliated Company

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CLUTCHES AND BRAKES
CLUTCH - BRAKE COMBINATIONS

This 24" diameter STEARNS Magnetic clutch and Brake Unit is providing smooth start and positive stop on a rubber mill in a prominent mid-western plant. Efficient, economical and safe, sizes and combination to meet requirements. Write for bulletin 225.

If you have a tramp iron problem ask for our Bulletin 301 on Magnetic Pulleys, improved, air-cooled, latest design. Sizes to fit your conveying system or self-contained unit.

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STEARNS MAGNETIC MFG. CO.
640 So. 28th St. Milwaukee (4), Wis.

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The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H, White; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York 20, N. Y.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron 8, Ohio

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 41 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
CONTINEX SRF—A New Semi-Reinforcing Furnace Black. *Now in Full Scale Production.*
Continental Carbon Co., *Mnfr.*
Witco Chemical Co., *Distributor*
295 Madison Avenue
New York 17, N. Y.

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York 13, N. Y.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York 6, N. Y.

CHEMICALS
PIGMENTS
ASPHALTUMS
Witco Chemical Company
295 Madison Avenue
New York 17, N. Y.

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CLAY
*CHAMPION
*MAGNOLIA
National Kaolin Company
Distributed by
C. P. HALL CO.
Akron — Los Angeles — Chicago

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N.Y.

CHEMICALS
From Coal Tar Bases—For Use As Antiseptics, Plasticizers, Reclaiming Oils, Softeners, Solvents, Tacifiers.
Koppers Company
Tar and Chemical Div.
Koppers Bldg. Pittsburgh, Pa.

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St., New York 1, N. Y.

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Anti-oxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK 20, N. Y.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
75 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

The Market Place

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COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

COMPOUNDING Materials
Vulcanizing Agents
Accelerators
Antioxidants
Plasticizers
Dispersions
Pigments
Clays
Mineral Rubber
Aromatics
Blacks
R. T. VANDERBILT CO.
230 Park Ave. New York 17, N. Y.

CUMAR —Paracoumarone Resin.
A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*
THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.
Wilmington Chemical Corporation
10 E. 40th St., New York 16, N. Y.

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)
Stamford Rubber Supply Co.
Stamford, Conn.

FURNEX—FURNEX BEADS
The High Resilience Semi-Reinforcing Black
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N. Y.

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon
Pampa, Texas

IRON OXIDES
Asbestine—Barytes—Talc—Soapstone
C. K. Williams & Co.
EASTON, PA.

MAGNESIA
Calcined Magnesia—for neoprene
Carbonate of Magnesia—precipitated
The Philip Carey Mfg. Co.
Cincinnati Ohio

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

MAGNESIUM OXIDE
Extra Light—Original neoprene type
Also Light, Medium and Heavy types
General Magnesite & Magnesia Co.,
2960 East Venango St., Phila. 34, Pa.

MICA
"CONCORD" Wet Ground Mica
Its *White, Pure* and *Uniform*
Send for Samples and Prices
CONCORD MICA CORP.
Penacook Station Concord, N. H.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
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Cincinnati Ohio

OROPLAST
Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks
Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
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Akron Ohio

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
GENERAL ATLAS CARBON
Pampa, Texas

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For Synthetic Rubber, Polyvinyl Butyral, etc.
Glyco Products Co., Inc.
26 Court St., Brooklyn 2, N. Y.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

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Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
National Rosin Oil & Size Co.
RKO Bldg., New York 20, N. Y.

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"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.
SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

TITANIUM PIGMENTS
TITANOX
Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
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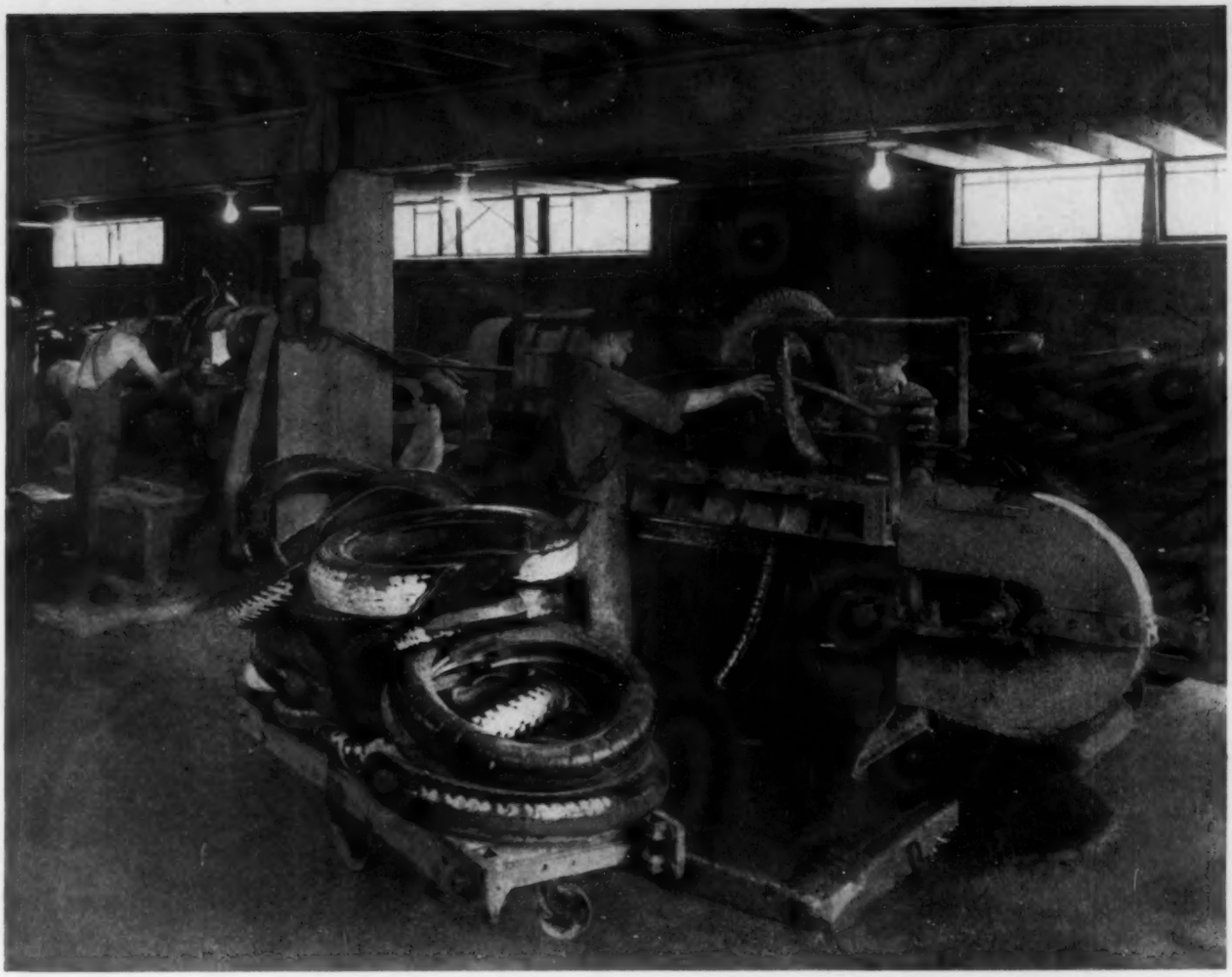

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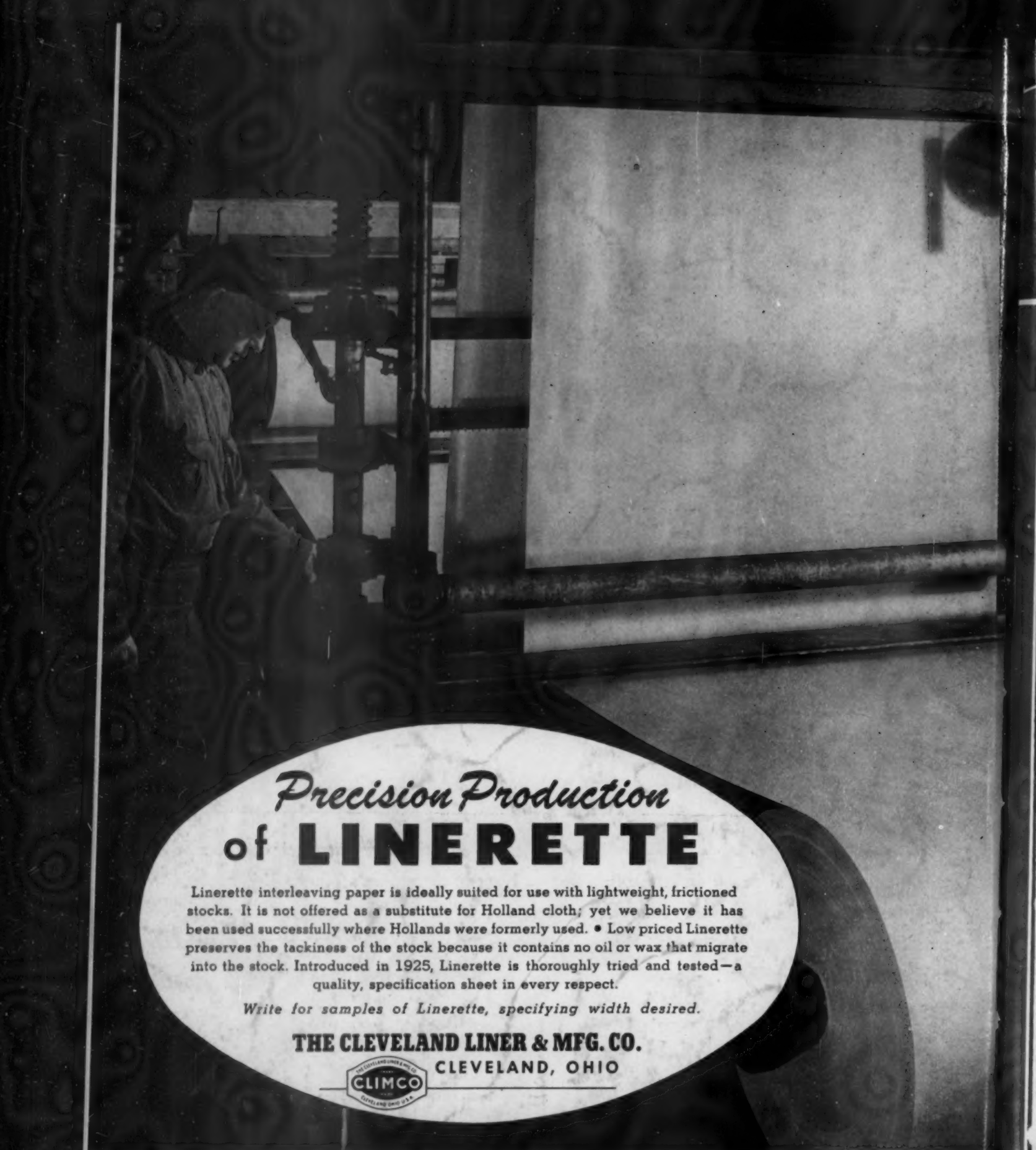

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